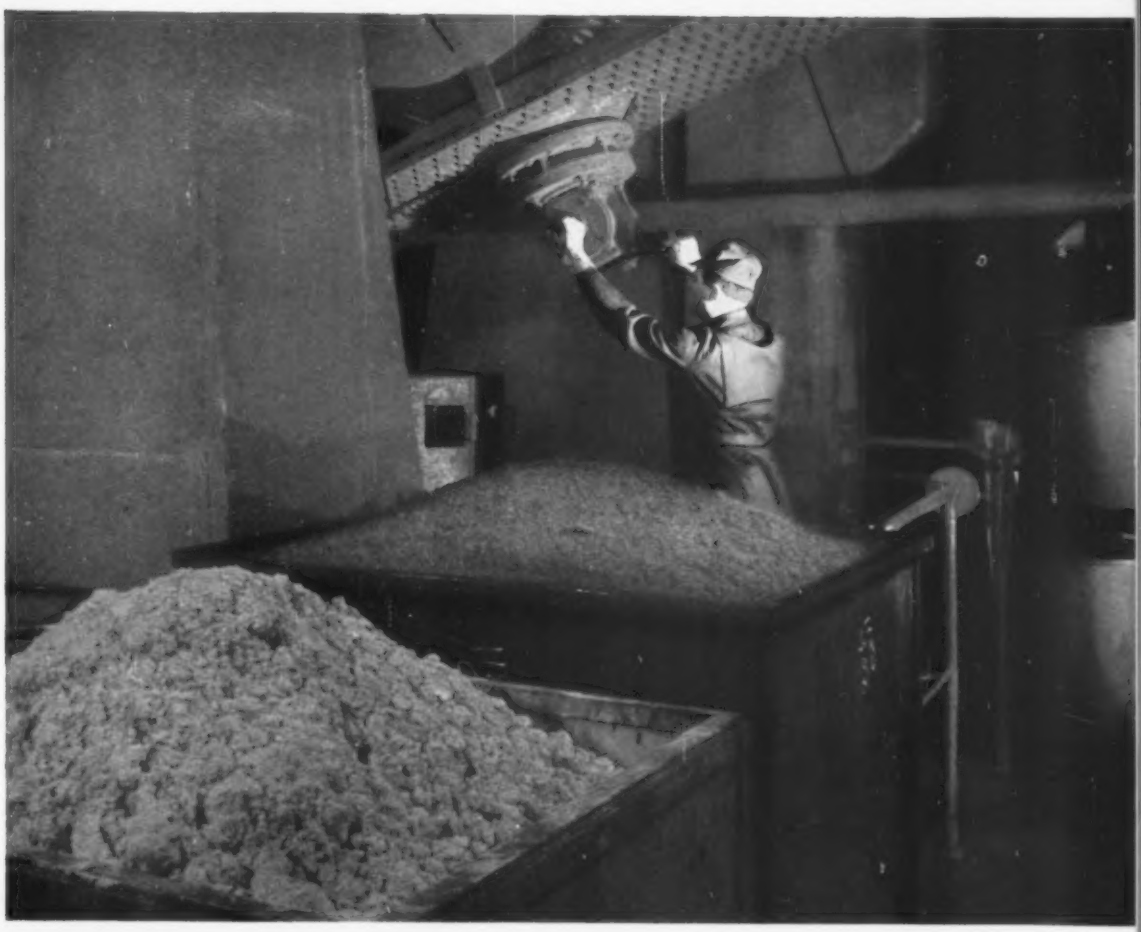
McGRAW-HILL INTERNATIONAL

Management Digest®

TECHNICAL • INDUSTRIAL • COMMERCIAL

DECEMBER 1956

OVERSEAS EDITION



A rush for new pigments (above) and dyes to meet the consumer's demand for color—p33

ALSO | The airplane: Another tool for modern management—p20
New products, new trends in office equipment—p58

Is your tubing bottleneck shown here?

Bundy Engineers and versatile Bundyweld Tubing can beat the knottiest tubing design problem!

If you think it can't be done with tubing, it's a challenge to Bundy. For years, Bundy Engineers have specialized in working with customers and prospects, solving the insolvable. A unique combination of imagination and experience, plus the extreme versatility of Bundyweld Steel Tubing, has paid off again and again.

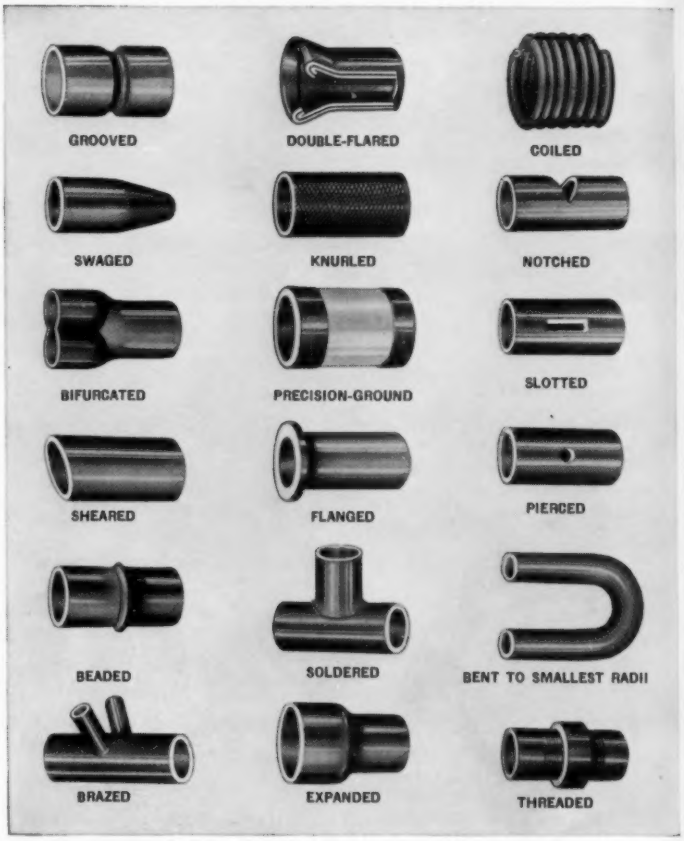
Check first with Bundy® for workable solutions to your tubing design problems. Whether you are in the design, developmental, or application stage of your product, Bundy will be glad to work with you. Hundreds of manufacturers have used this Bundy service to advantage.

Bundyweld Tubing offers an unusual combination of properties: high thermal conductivity; high bursting strength; ease of fabrication; and thinner-walled, yet stronger composition. It is the safety standard of the refrigeration industry, and is used in 95% of today's cars, in an average of 20 applications each.

Write, or cable us today!

BUNDY TUBING COMPANY

DETROIT 14, MICHIGAN, U.S.A.



Shown above are but a few of the fabrication operations which are possible with Bundyweld Steel Tubing. Many of these, and others not shown, were developed through solving a specific problem brought to us by a customer or prospect. Bundy invites you to avail yourself of this design service.

WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING. AFFILIATED PLANTS IN AUSTRALIA, ENGLAND, FRANCE, GERMANY, AND ITALY

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness,

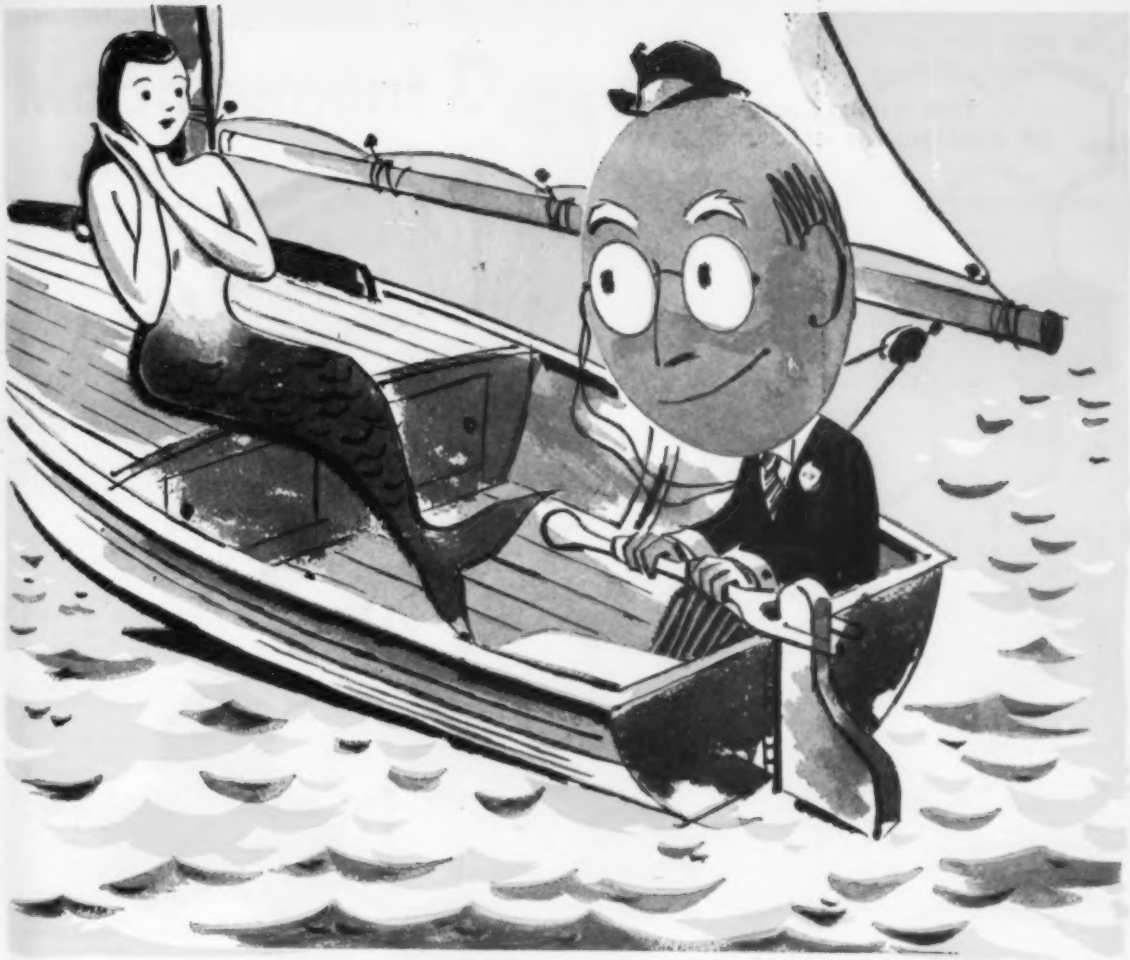
and passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

BUNDYWELD® TUBING

DOUBLE-WALLED FROM A SINGLE STRIP

- Sizes up to 5/8" O.D.
- Leakproof
- High thermal conductivity
- High bursting point
- High endurance limit
- Extra-strong
- Ductile
- Lightweight
- Machines easily
- Takes plastic coating
- Takes plating
- Shock-resistant
- No inside bead
- Uniform I.D., O.D.



Smoother sailing here!

You'll find that things go ever so much easier when you start routing cargoes through Newport News, Virginia. Chesapeake and Ohio tracks go right to shipside. No drayage or lighterage. Labor is efficient and dependable. Paper work goes through quickly and smoothly because Newport News is a small city where everybody knows everybody. There is also a substantial saving on inland freight rates to and from most of the Mid-West and Mid-South.

WRITE FOR FREE, ILLUSTRATED BOOKLET which tells you about all the facilities and advantages you can enjoy.

Chesapeake and Ohio Railway

WORLD COMMERCE DEPARTMENT, NEWPORT NEWS, VA., U.S.A.

World Commerce Dept. Offices

Chicago 4, Ill.....327 So. LaSalle Bldg.
Detroit 26, Mich.,.525 Lafayette Bldg.
Richmond 10, Va.....909 East Main St.
New York 7, N. Y.....233 Broadway
Stockholm, Sweden.....Kungsgatan 7

SHIP THROUGH NEWPORT NEWS, VIRGINIA it's easier and saves dollars

INVENTORY CONTROL

a problem today . . . but what about tomorrow?

To administer inventory investment today, and at the same time prepare for an even busier tomorrow, more and more businesses are turning to IBM data processing systems. Now, even the most complex inventory control problems become a matter of routine.

For *every* inventory problem, there is a profitable IBM data processing solution. *Now* is the time to get the full IBM story for your business.

IBM WORLD TRADE CORPORATION

Offices in principal cities of the world

DATA PROCESSING • ELECTRIC TYPEWRITERS • TIME-RECORDING EQUIPMENT

McGRAW-HILL INTERNATIONAL

Management Digest®

THE BEST FROM 68 BUSINESS MAGAZINES

Volume 11—Number 12

CHARLES S. MILL.....Publisher
PAUL R. MILLER, JR.....Editor
JOSEPH A. COHN.....Managing Editor

EDITORIAL STAFF
Thomas B. Winston..associate editor
D. Bujara .....editorial assistant
I. Dunay .....editorial assistant

ECONOMICS STAFF
Walter Diamond .....director
Foreign Economics Dept.
Dexter Keezer .....director
McGraw-Hill Economic Dept.

NEWS BUREAU
Atlanta .....A. R. Henry
Bonn .....Gerald Schroeder
Cleveland.....Robert E. Cochran
Detroit .....Harry Homewood
Houston.....James A. Lee
London .....William Coughlin
Los Angeles.....John Shinn
Melbourne .....Alicja Grobtuch
Mexico City.....John H. Kearney
Paris.....Robert E. Farrell
Rio de Janeiro.....Peter Weaver
San Francisco....Margaret Ralston
Tokyo .....Dan Kurzman
Washington.....George B. Bryant
Correspondents also stationed in:
Amsterdam, Bangkok, Bombay, Buenos Aires, Cairo, Caracas, Geneva, Istanbul, Johannesburg, Karachi, Madrid, Manila, Rome, Stockholm, and 30 other cities.

ADVERTISING REPRESENTATIVES
New York.....K. P. Bliss
Atlanta.....W. D. Lanier
Boston.....K. P. Bliss
Chicago.....James A. Shipley
Cleveland.....W. S. Bliss
Dallas.....G. L. Jones
Detroit.....Donald M. Oldroyd
Los Angeles.....Carl Dysinger
Philadelphia .....George Barnes
Pittsburgh.....W. S. Bliss
San Francisco.....John Otterson
St. Louis.....James A. Shipley
Frankfurt .....George Linder
London .....Herbert Lagler
Paris .....Claude Dupuy

Business Manager.....W. J. Maher
Production Manager....H. E. Schorr

McGraw-Hill International MANAGEMENT DIGEST
Formerly McGraw-Hill DIGEST

Overseas and Latin American Editions are published monthly by McGraw-Hill International Corporation for circulation in all countries of the world except the United States and Canada. Executive, editorial, advertising and subscription office: 330 West 42nd Street, New York 36, N. Y., U.S.A. Publication office: 99-129 North Broadway, Albany 1, N. Y. Donald C. McGraw, Chairman of the Board; Paul Montgomery, President; Eugene P. Warner, Senior Vice-President; Joseph A. Gerardi, Treasurer; John J. Cooke, Secretary; K. Presbrey Bliss, Vice-President; J. E. Blackburn, Jr., Director of Circulation.

Subscriptions may be ordered through Director of Circulation or your local book dealer. Subscriptions to Management Digest are solicited only from management men in business and industry. Subscription orders must indicate position and company name. Subscription rates: $5 for 1 year, $8 for 2 years, or $10 for 3 years; single copy 50¢ (U.S. currency). Second-class mail privileges authorized at Albany, N. Y. Copyright, 1956 by McGraw-Hill International Corporation. Reproduction of items in full or part without written permission prohibited in all parts of the world. For change of address, please send us your complete new address, as well as a clipping of the old envelope showing your old address.

Member—Audit Bureau of Circulations

CONTENTS FOR DECEMBER 1956

IN THE WORLD THIS MONTH

New Hope for Unity in Europe: A common market of 240-million people may be coming in Europe..... 13
Changing the Face of America: Vast construction activity in the U.S.A. is felt everywhere..... 15
Management at Work: A Mexican, a Lebanese, and a German meet old—and new—problems..... 18

MANAGEMENT METHODS

Business Flying Has Come of Age: More businessmen find the airplane a useful tool in modern management..... 20
Studying Motivation and Job Skills: What management can do to find and develop good supervisors..... 26
Overhauling a Company for Profit: New machines, new methods, new thinking revitalize an old company..... 30
Also: Management solves trademark, reading speed, and communication problems **(p25)**; How to plan a meeting **(p28)**

NEW PRODUCTION TECHNIQUES

Dyes and Pigments: A Colorful Future: Consumer's taste for color means more production, and more problems, for dyes and pigments 33
Metal Selection Saves You Money: Some metals machine easier than others. Here's how to take advantage of that fact 35
Welding Shows New Tricks: Everywhere, welding techniques are taking on new jobs—and doing old ones better..... 39
Also: A new machine that provides cheap liquefied gases **(p34)**; News about a unique air-conditioning system, "atomic" glass, coiled adhesives, textiles **(p45)**

MARKETING

Packaging Design Is Your Problem: Top management must take the lead if it wants a package that will sell..... 47
How to Evaluate a Package Design: Here are the three elements of a package. Recognizing them makes package decisions easier 48

FINANCE

Study Each Product—and its Profit: Management should know if each product contributes its fair share to overall company profits 49
Financial Digest: Multilateral payments unions have helped to free international trade. Now the idea is spreading..... 53

RESEARCH

A Rich Reward in Catalysts: The answer to "How do catalysts work?" may mean new products, cheaper processes..... 54
What's New in World Research: Cryotron may open doors to new electronic "miracles;" does Britain spend enough on research?"; Venezuela builds a center to study the brain..... 56

PLUS . . .

Editor's Page ..... 4 You 31
World Trends ..... 7 Product Digest 58
Management Reading 70

PICTURE CREDITS: Industrial Design, Whitney Publications, Inc., photographed by Alexandre Georges—cover; Modern Packaging—p48

NEW YORK CITY
DECEMBER, 1956

The Readers Report . . .

What Kind of Billions?

In an international paper such as yours, would it be wise when quoting values by name, ex: Billions, to supplement the name with figures, or with the name or initials of the country concerned. Example: billion—1,000,000,000, or billion (U. S.)?

There is a wide difference between a Billion with nine noughts hanging on its tail, and a Billion having 12.

G. R. GAUNT
REUBEN GAUNT & SONS LTD.
FARSLEY, YORKSHIRE, ENGLAND

• English billions are different from American billions. So for the benefit of our British readers (and any others who may be confused) we now publish billions as thousand millions—$5-billion becomes $5,000-million.

Inflation Worries

I have read with interest the digest of an article by Dr. Frederic C. Jelen, "When You Buy—Figure on Inflation," in the September issue of your excellent magazine.

I shall be very pleased to receive a more detailed treatment of capitalized cost and the Jelen formulas. In fact, if you can spare them, I could do with two copies as I should like to hand one to my department head. . . . I am sure that once he gets his hands on a copy he won't let it go without a struggle.

J. R. DOUGLAS
OXFORD, ENGLAND

Here in Chile, the inflation problem is one of the most difficult to be evaluated in any economic study, especially in equipment selection and cost estimating. For this reason, I am interested in the most complete information . . .

RAFAEL JAIME HEVIA RIVAS
SANTIAGO, CHILE

Dr. Frederic C. Jelen's treatment of capitalized cost . . . will be valuable collateral reading for my students of Industrial Economics.

ALVARO MIGUEZ BASTOS DA SILVA
CENTRO TECNICO DE AERONAUTICA
SAO JOSE DOS CAMPOS, BRAZIL

Please refer to the issue of September, page 18, in the article "When You Buy—Figure on Inflation." The formula written thus:

$$C = \frac{K\ (1+i)^m - 1}{(1+i)^m}$$

should have been written:

$$C = \frac{K[(1+i)^m - 1]}{(1+i)^m}$$

A. RODRIGUEZ ULLOA
MEXICO, D.F.

• Several score MANAGEMENT DIGEST readers have written asking for more detailed treatment of the Jelen formulas—the study of capitalized cost in an inflationary era. If other readers want copies, we still have some available. By the way, Sr. Rodriguez Ulloa is correct!

An Idea that Satisfies

Here is my renewal subscription for MANAGEMENT DIGEST. I have hesitated . . . before deciding to renew it. . . . However, I have just read your article of August—"A New Approach to Office Management." We are discussing this sound, thorough, and brief article in our District of the South African Railways New Works Division. We may well adopt many of the ideas given.

One criticism sincerely given: In this country we believe that America has more to offer the world than Money and "Know How," important though these are. After all, the Russians and the East Europeans offer us in Africa precisely the same commodities, only they do it as part of an intelligent ideological strategy. What we need as well as material things is an idea that really satisfies; an over-arching ideology that binds us together and breaks down every barrier, of class or race or creed.

In this ideological age, to be relevant, a business or an Engineer must know how to meet the deepest needs of the men and women around him, and of those who lead his nation. . . . I know that money is not enough to satisfy. A man must have moral backbone and ideological intelligence to know what to do with it.

R. W. GRESTY
JOHANNESBURG, SOUTH AFRICA

Using Management Digest

. . . Many a time I find a condensed article in MANAGEMENT DIGEST which is the base of a talk with one of my division managers, and is very helpful to draw their and my interest to certain points, which otherwise certainly would not be overlooked, but would not be dealt with at that moment or even not as thoroughly.

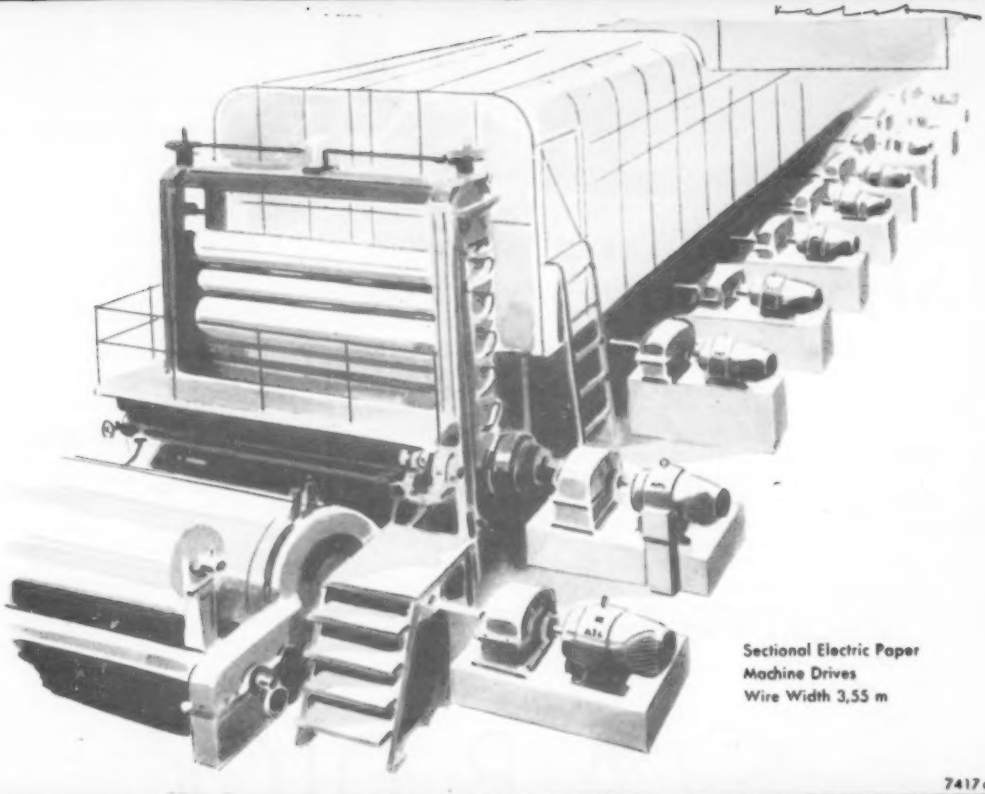
G. F. DALENOORD
HAREN, NETHERLANDS

AEG

Electrical Equipment for the Paper Industry

Only well designed electric drives coupled with accurate regulation enable the paper industry to cope with ever increasing demands.

Extensive work by the AEG in this field helped to increase production and economy with added safety.

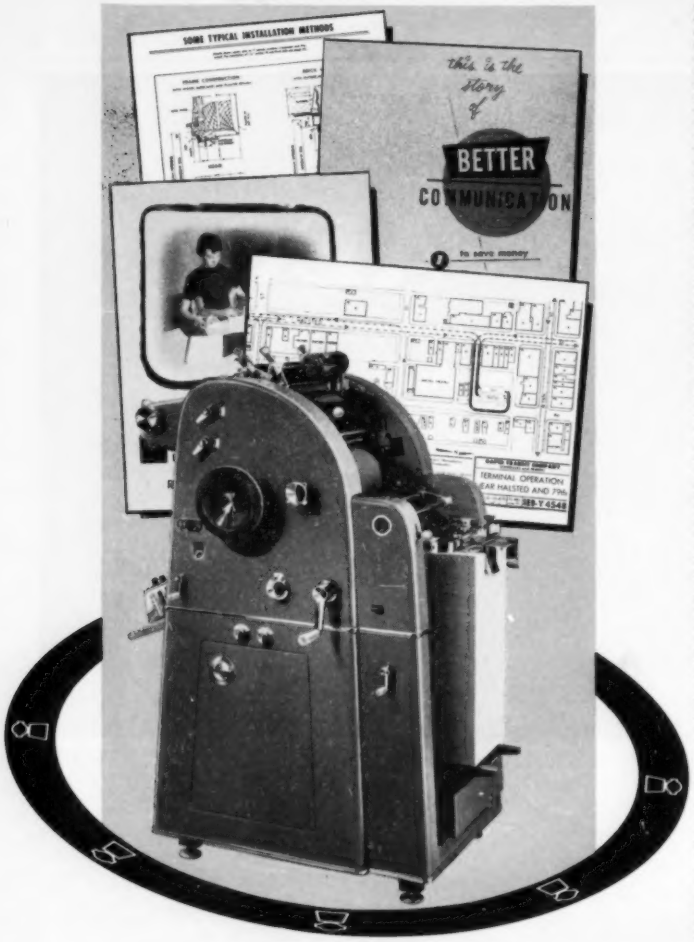


Sectional Electric Paper Machine Drives
Wire Width 3,55 m

7417 a

ALLGEMEINE ELEKTRICITÄTS-GESELLSCHAFT

Berlin (West) EXPORT DEPARTMENT Frankfurt (Main)



amazed at new OFFSET DUPLICATOR

All the people who have seen the new A. B. Dick Model 350 offset duplicator are amazed at the speed and ease it provides for producing so many different kinds and sizes of copies. For example, the feed table can be set from post card size to letter size and larger in less than one minute.

There are no roller or cylinder pressure adjustments to make for different weights and sizes of paper or card stock.

One simple setting of the Aquamatic control assures correct balance of ink and water to produce ten to thousands of beautiful copies of linework, solids or half-tones in sharp black or brilliant colors.

For more information call or write your distributor of A. B. Dick products. You will find his name listed in this advertisement. Or write A. B. Dick Company, Chicago 31, Illinois, U. S. A.— Cable Address: DICK, Niles, Illinois.

Here are your distributors of A. B. DICK products

Kilburn & Company (Pakistan), Ltd.
Dacca, East Pakistan

Pierre Vitalis
Alger, Algeria

Stott & Hoare S.A., Ltd.
Adelaide, South Australia

Stott & Hoare Pty., Ltd.
Melbourne, Australia

Casa Americana Comerciale, S.A.R.L.
Luanda, Angola

Stott & Underwood Pty., Ltd.
Sydney, Australia

William W. Cartwright & Co.
Nassau, Bahamas

Nogueira & Cie
Belgian Congo

Tondelier Freres, S.P.R.L.
Brussels, Belgium

Pearman, Watlington and Company
Hamilton, Bermuda

The Office Appliance Co., Ltd.
Victoria, Hongkong

A/S Dansk Formulartryk
Copenhagen, Denmark

Nile Stationery Company
Cairo, Egypt

Oy. Herman Lindell A.B.
Helsinki, Finland

G. Guyot-Fourchault
Paris, France

P. Solomos & Co.
Athens, Greece

Messrs. Kilburn & Company, Ltd.
Calcutta, India

Ruys' Handelsvereeniging
The Hague, Holland

Thorsteinn Bergmann
Reykjavik, Iceland

Ruys' Handelsvereeniging Voor
Indonesie N. V.
Djakarta C, Indonesie

R. Kiankhooy Fard
Saraye Cyna No. 22
Teheran, Iran

Israel Paper Corporation—*Mira Foundation—Ltd.*
Tel Aviv, Israel

Nebuloni & Picozzi
Milan, Italy

Ksuda Shoten, Ltd.
Higashiku, Osaka, Japan

Office Supply Company
Nairobi, Kenya, British East Africa

United States Trading Division
Akron 17, Ohio
(Distributor for Liberia, West Africa)

Beechey & Underwood, Ltd.
Auckland, New Zealand

Alf. G. Johnson A-S
Oslo, Norway

Erlanger & Galinger, Inc.
New York 4, New York
(Distributor for Manila, Philippines)

Sociedade Equipamento De Escritoria, L. Da.
Lisbon, Portugal

Aktiebolaget Arvid Lidberg
Stockholm, Sweden

J. F. Pfeiffer A-G
Zurich, Switzerland

Ets Solas & Messica
Tunis, Tunisia

A·B·DICK®
THE FIRST NAME IN DUPLICATING

WORLD TRENDS

THE REAPPRAISAL

Businessmen are groping with an uncertainty they have not known since the early days of the Korean War. They cannot help but re-examine their plans for 1957.

But reappraisal—"agonizing reappraisal" at that—faces men everywhere as a result of the past six weeks:

In the Soviet Empire, Poland and Hungary have shattered the illusion of Communist unity and "peaceful coexistence." The Communist economic drive into Asia and Latin America, based partly on East European goods, will slow. To the extent the Soviets decide to rehabilitate East European economies, their own Five Year Plan will suffer. Already, Russian military strategy in Europe has had to change.

In the U.S.A., President Eisenhower—and "Eisenhower internationalism"—has an overwhelming mandate from the voters. Yet his Administration's foreign policy faces a searching review. There will be questioning—of everything from military alliances to trade legislation. Major cabinet changes are coming, probably including the Department of State.

In Europe and Asia, political and trade relations will remain disrupted even if the Suez Canal is reopened soon, and the Middle East calms. Confidence in the Commonwealth, in Sterling, in foreign investment is severely shaken. Many nations look to the Western Hemisphere for some essential supplies, and are re-examining their military spending plans in the light of Soviet tactics.

Inflationary pressures apparent before the crisis will intensify—especially if the world faces renewed "Cold War."

Prices of commodities moving in international trade are trending upwards—if only because of the shortage of shipping. Any oil deficit can be made up (there's plenty of oil already above ground in the Western Hemisphere), but at a price. Dollar coal is available too—at high cost. Steel and scrap prices, in the U.S.A. as well as Europe, are headed higher. Anti-inflationary measures in many nations may get their most severe test.

Overall, it is a question of business confidence. Expect management men to look to their inventories—and wait to see what comes next.

CALDER HALL

The world has its first full-scale atomic power plant: Calder Hall, now operating in northwest England. It is the brilliant beginning of a network of plants throughout Britain.

But Calder Hall does not mean that atomic power plants for civilian use are here today—ready to be set up anywhere. It is a test, a prototype—and admittedly an inefficient one. It is not primarily a commercial power producer. Rather power is the byproduct of Calder Hall's main function to produce plutonium for the military.

Calder Hall is a reminder of Britain's determination to have atomic power—soon. And it may move some other nations to faster action.

The Soviet Union is known to be speeding its nuclear power plans. And there are new signs that the U.S.A. will work faster in power plant

Turn the page for more WORLD TRENDS

development (Management Digest, Nov. p. 11). Private industry is proposing several more major power plants, and the government seems ready to take a larger part in power plant construction.

That is true overseas as well as in the U.S.A. The Atomic Energy Commission and the Export-Import Bank have just announced that they stand ready to make atomic power plant loans to both private utilities and governments in other nations.

LOOKING FOR PARTNERS

Talk of a Common Market and associated trade zone in Europe (page 13) encourages North American businessmen to consider expanding operations on the Continent.

They want to be "on the ground floor" in a European mass market. And they believe that the future of European-Latin American trade is brightening—so that being "on the ground floor" in Europe may help them in Latin American trade.

So, in 1957, Americans will speed their search for licensing arrangements with Europeans. And they will look for partners in "50-50" companies.

The "50-50" company is a separate enterprise set up jointly by two other concerns, each owning half. They are formed to (1) integrate supplies and research, (2) use joint facilities, and (3) develop new products and markets. Both companies stand behind the new enterprise for credit purposes, and usually supply management.

What American management men look for in a "50-50" company is the extra value that a partner can supply which they cannot. Right now, that "extra value" may be a strong place in the European market.

TOMORROW'S TRAVEL

It is none too soon for businessmen to start thinking about the on-rushing age of mass, cheap air travel.

Imagine fleet of jet airliners, each capable of carrying 150 people twice daily across the Atlantic, or from New York to Rio. Imagine 1.5-million Americans visting Europe in 1960, compared to 600,000 in 1956. And that ratio of increase might be even higher for Latin America, and in parts of Asia.

The airline industry is frankly worried about problems of the "jet age." Air traffic control methods and equipment are inadequate—not only for commercial aviation, but for the increasing tempo of business flying (page 20). Runways are too short, airports overcrowded. Terminal-to-city transport is tied up. Hotels and other tourist facilities are generally out-of-date, and in short supply.

The airline industry, the United Nations, and groups like the European Travel Commission have just begun studies of the problems. But businessmen in general can expect to become involved, too.

Taxpayers and investors will be called upon to help finance new facilities. Private corporations must develop new equipment and methods for aviation; and businessmen must work together to expand their nation's entire tourist industry plant—especially hotel accommodations.

It is not just a question of air travel. Railroad and highway transport is inadequate to meet 1960's wave of tourism.

Thus the "jet age" presents management with civic responsibilities—as well as profitable business opportunities.

Higher Profits, Lower Costs, With G-E Products

Uninterrupted service is of vital importance to industry. Whether you generate power or buy it, your first step toward production economy lies in a power-distribution system keyed to the particular problems of your process plant. Owners and operators know that General Electric has the experience necessary to help solve their individual power requirement problems most economically.

Checking your distribution system carefully will pay handsome dividends. Process industry plants have a habit of growing faster than their facilities. If your power-distribution system has stretched to reach new buildings and to carry new and heavier loads, you can usually achieve a good profit by rechecking the system and—with dependable General Electric equipment—modernizing it to fit today's load conditions.

G-E experience and know-how can help you plan wisely for the future. In mining, petroleum, sugar, steel, in almost all industries, all over the world, every electrical need of your process operation can be supplied from the broad range of products made better by General Electric. Consult your nearest G-E representative. *International General Electric Co., Dept. 56-19E, 150 East 42nd Street, New York 17, N. Y., U. S. A.*

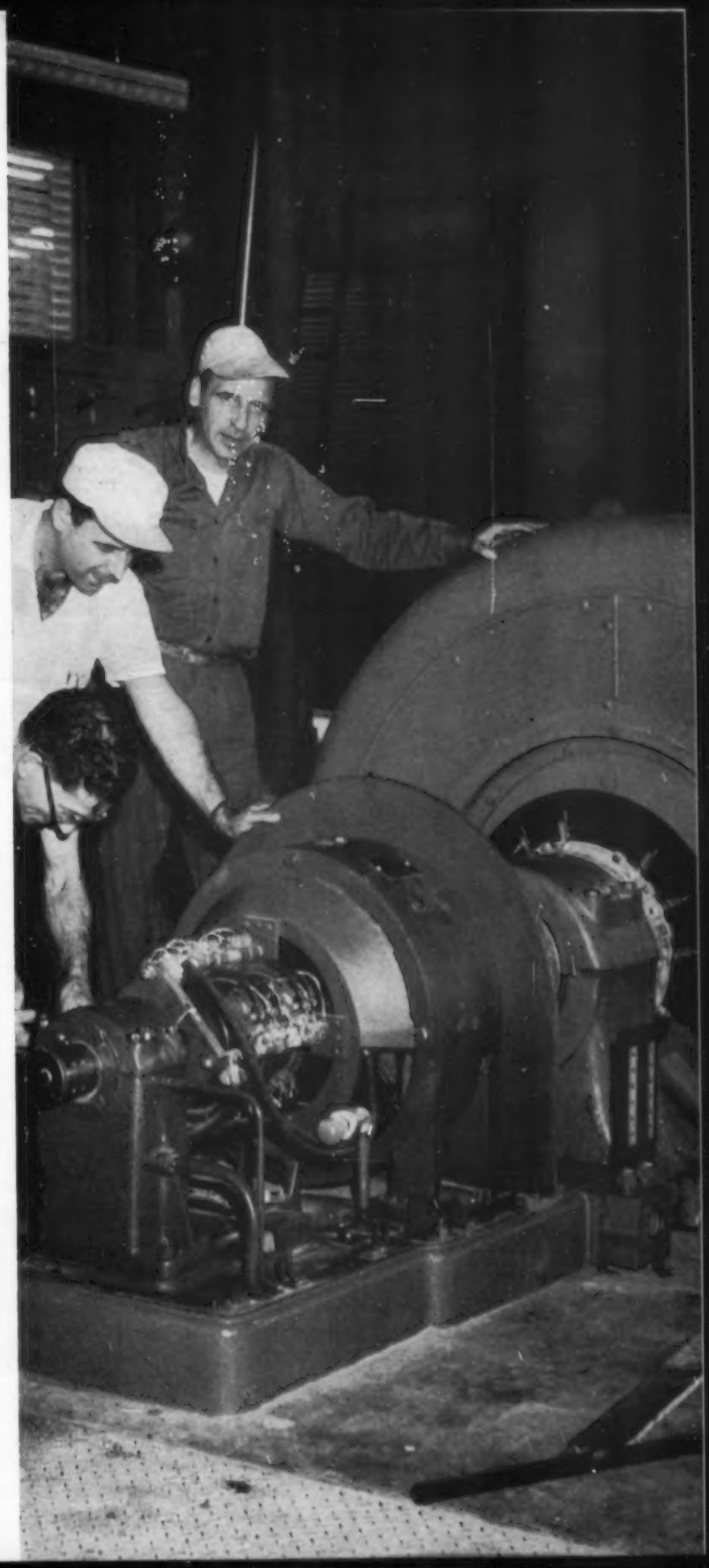
For further information concerning G-E services, write for bulletin GED-2244.

IA-56-19E

Progress Is Our Most Important Product

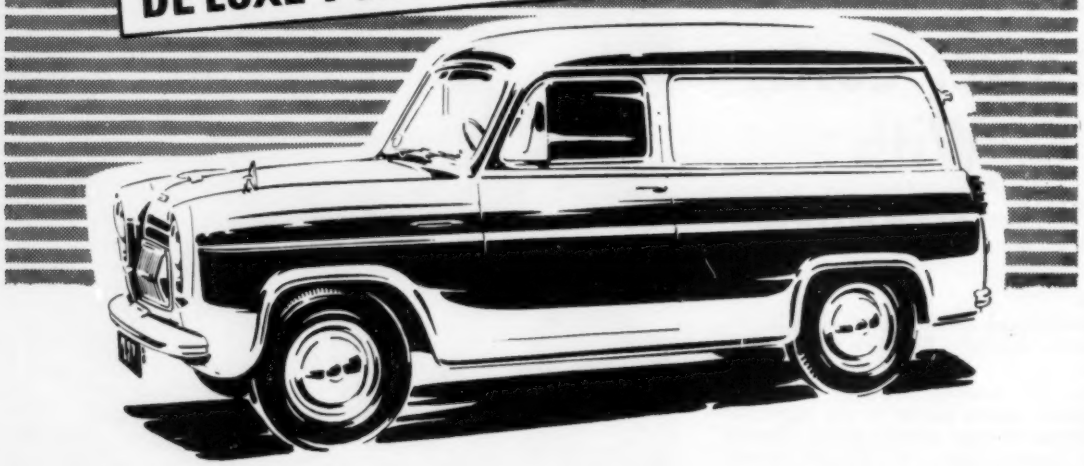
GENERAL ELECTRIC

– U. S. A. –



THAMES

DE LUXE 7 cwt. (350 k.g.) and ¼ TON vans



NEW LOOK FOR *NEW* PROFITS

The New Thames de Luxe 7 cwt. (350 k.g.) Van has an air of quality—a new look that adds prestige to any business. With extra load capacity, smooth all-steel body and in-built British quality, the new Thames de Luxe 7 cwt. (350 k.g.) Van scores on *all* these extra points, too . . .

- EXTRA STRENGTH REAR SPRINGS
- LEVER TYPE DOUBLE-ACTING REAR SHOCK ABSORBERS
- TWIN WINDSCREEN WIPERS
- CHROMIUM PLATED FRONT & REAR BUMPERS & HEADLAMP SURROUNDS
- DISTINCTIVE RADIATOR GRILLE
- SEE YOUR FORD DEALER FOR FULL DETAILS

for the smaller load the smaller Van—the Thames ¼ Ton (250 k.g.) Van. Same wonderful value . . . same superb performance.

. . . and World-Wide service too !

ASK YOUR DEALER about the rest of the famous range of Thames Commercial Vehicles, the standard 7 cwt. (350 k.g.) Van and the brilliant ½ ton Van, tested and proved over millions of miles. The 1½, 2, 3 and 4 ton Trucks fitted with the outstanding DAGENHAM-BUILT DIESEL ENGINE or the 'Cost-Cutter' Petrol Engine . . . and the 5 ton models with choice of the powerful, economical 85 b.h.p. V.8 Engine or the famous P.6 Diesel.

PRODUCTS OF FORD ENGLAND MOTOR COMPANY LTD

from the mines . . .

to every form of manufacture

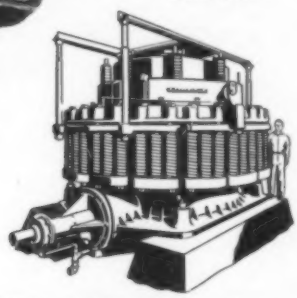
View shows the MS "CITY OF QUITO", one of the many seagoing vessels dependably powered by NORDBERG DIESEL ENGINES.

ZINC

proves its usefulness to man . . .

Virtually unknown to ancient man, the constantly increasing use of zinc has played an important role in the development of modern civilization . . . on land, from pharmaceuticals to transportation equipment, on through the electrical and telephone industries . . . at sea, from navigational equipment to the many forms of corrosion protection necessary to guard vessels against the elements . . . and in thousands of other applications touching almost every conceivable industry and product, and making our lives better as a result.

In the production of zinc, *as in all of the great ore and industrial mineral operations the world over,* Symons® Cone Crushers have aided in civilization's requirements by making possible increased production to meet growing demands, and by reducing the cost of this production through more efficient crushing operations.



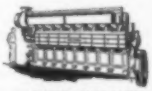
SYMONS Cone Crushers . . . the machines that revolutionized crushing practice . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.

SYMONS GYRATORY CRUSHERS

GRINDING MILLS

MINE HOISTS

SYMONS VIBRATING BAR GRIZZLIES and SCREENS



DIESEL ENGINES

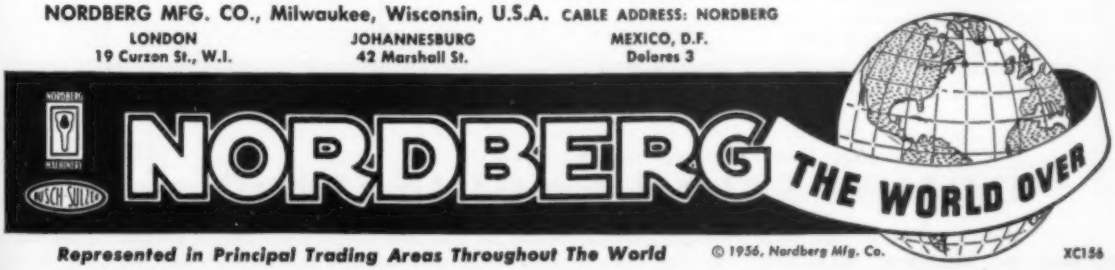
SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD

NORDBERG MFG. CO., Milwaukee, Wisconsin, U.S.A. CABLE ADDRESS: NORDBERG

LONDON
19 Curzon St., W.1.

JOHANNESBURG
42 Marshall St.

MEXICO, D.F.
Dolores 3



Represented in Principal Trading Areas Throughout The World

© 1956, Nordberg Mfg. Co.

XC156

$350,000,000 SUCCESS STORY

In December, 1941, a group of 165 engineers watched the first phase of what has proved to be the most remarkable success story in power boiler history. They were visiting the Somerset Station of the Montaup Electric Company at Somerset, Massachusetts. They came to inspect a boiler . . . a controlled circulation boiler.

Nearly 10 years elapsed before utility companies—restricted during the War and faced, postwar, with a vast pent-up demand for power—were in a position to consider basically different equipment. Then, in July, 1950, Virginia Electric & Power Company, in collaboration with their consultants, Stone & Webster Engineering Corporation, ordered a C-E Controlled Circulation Boiler. A new trend was on! Leading utilities from coast to coast ordered and reordered Controlled Circulation Boilers to a present total investment of more than $350,000,000. The equivalent turbine capacity of these boilers is about 15,000,000 kw, or nearly 17 percent of the total fuel-generated capacity of the U.S. utility industry.

Such large-scale acceptance of a new design of boiler in so short a period of time is unique. As a matter of fact, there is nothing in the annals of power history that even approaches it.

Nor is the importance of the C-E Controlled Circulation Boiler limited to the United States. Indeed, the adoption of the design for large units around the world now seems inevitable. Like so many other developments which were pioneered by Combustion—and which now enjoy international acceptance—C-E Controlled Circulation, too, will help meet the power needs of expanding industry throughout the free world.

Please direct inquiries to our Export Department in New York.

THESE LEADING UTILITIES HAVE INVESTED $350,000,000 IN C-E CONTROLLED CIRCULATION BOILERS SINCE 1950

Alabama Power Company
*Boston Edison Company
Carolina Power & Light Company
Chicago District Electric Generating Corporation
Chubu Electric Power Company
*Cincinnati Gas & Electric Company
*Cleveland Electric Illuminating Company
*Commonwealth Edison Company
Connecticut Light & Power Company
*Consumers Power Company
*Detroit Edison Company
*Duke Power Company
*Houston Lighting & Power Company
*Hydro-Electric Power Commission of Ontario
*Illinois Power Company
Kansai Electric Power Company
*Kansas City Power & Light Company
Kansas Power & Light Company
Kyushu Electric Power Company
*Niagara Mohawk Power Corporation
*Northern Indiana Public Service Company
*Pennsylvania Electric Company
*Philadelphia Electric Company
*Potomac Electric Power Company
*Public Service Electric and Gas Company
*Rochester Gas & Electric Corporation
*South Carolina Electric & Gas Company
*Southern California Edison Company
*Tennessee Valley Authority
*Virginia Electric & Power Company
*Wisconsin Electric Power Company

*More than one unit.

The following engineering firms were associated with one or more of these installations:—

Bechtel Corporation
Black & Veatch
Commonwealth Associates, Inc.
Ebasco Services, Inc.
Gilbert Associates, Inc.
Jackson & Moreland
Sargent & Lundy
Stone & Webster Engineering Corporation
United Engineers & Constructors, Inc.

associates, licensees and representatives throughout the free world

COMBUSTION ENGINEERING

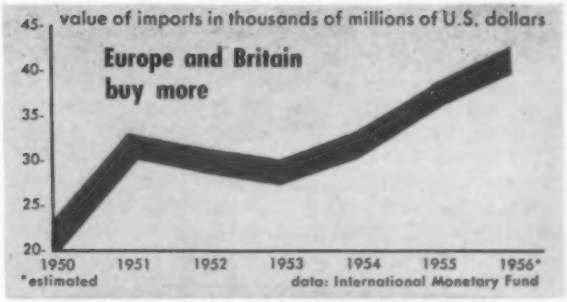
C-E

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

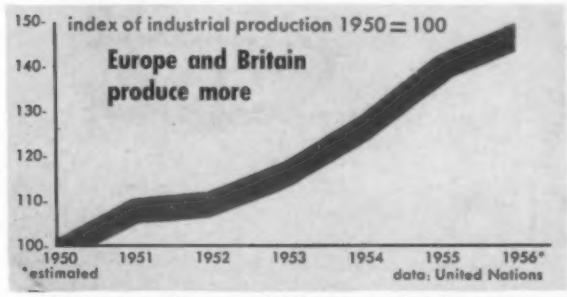
B-958

STEAM GENERATING UNITS · NUCLEAR REACTORS · PAPER MILL EQUIPMENT · PULVERIZERS · FLASH DRYING SYSTEMS · PRESSURE VESSELS · HOME HEATING AND COOLING UNITS · DOMESTIC WATER HEATERS · SOIL PIPE

A mass market of 240-million—
—if Europe decides for unity.
six coal-steel community nations would make up Common Market
these nations would join trade zone linked to Common Market



Western Europe and the United Kingdom are today the fastest growing major market—together they account for over 40% of the total world imports.



Spurred on by a world boom, and rising consumer demand at home, European and British industrial strength is growing fast.

New Hope for Unity in Europe

Digested from BUSINESS WEEK, Oct 20, p23

THE peoples of Western Europe are moving toward a momentous decision—whether to join together to create a single market of 240-million people, and thus lay the economic foundations for a "United States of Europe."

If the European nations decide to go ahead, Western Europe will see a period of sweeping changes over the next two decades. Businessmen throughout the world can look forward to dealing with a new, vastly stronger Europe.

The idea for European economic integration is not new. But enthusiasm for it is even stronger now than it was when the six nation Coal & Steel Community was established. Leaders of "The Six" (Germany, France, Italy, Belgium, Netherlands, Luxembourg) are far along in drafting a plan for a customs union called the "Common Market." In addition, they are at work on "Euratom," a nuclear energy pool among Europeans.

Perhaps the most important new impetus to European economic cooperation is the fact that Britain has dropped its former aloofness to economic ties with the Continent. Indeed, the British government is seriously considering supporting the Common Market, and grafting on to it an associated free trade zone consisting of Britain, and perhaps the Scandinavian nations, Switzerland, and Austria.

The process cannot be easy. France, for example, may insist that its protectionist system stay almost intact in the Common Market. West Germans are not completely convinced about Euratom British industrialists and labor unions must be sold on free trade with Europe.

And even if draft treaties are signed for the Common Market, they must be approved by the Parliaments of The Six. It was at this stage that the postwar proposal for a European Defense Community failed, in the French assembly.

The leaders of the European unity movement—like Jean Monnet and Premier Guy Mollet of France, Germany's Adenauer and Belgium's Spaak, know it is painful for any nation to shed even a small part of its sovereignty, or for industry to give up a sheltered market. For this reason, they are emphasizing the advantages of a large, free market, rather than discussing the problems of sovereignty amid supranational insti-

"... the only real protection left for the six members would be a common tariff against the rest of the world."

tutions that figured in debate over earlier integration moves.

The goals of these "Europe-minded" statesmen are clear.

Economically, they aim for a mass market on the U.S. scale. They believe that in the era of industrial automation and atomic science, nations of 50-million people and less cannot support an industrial structure competitive with what the U.S.A. has today, or with what can be expected soon in the Soviet Union, or someday in China. Take auto production. These "Europeans" see just two or three auto centers—"Detroits" if you will—in the whole of Western Europe, with five or six major auto producers instead of the 15 or so that exist today.

Politically, the "Europeans" hope to develop enough unity to (1) carry through the proposed economic integration and (2) face the rest of the world with a common policy on issues that vitally affect all Europeans.

The British government wants to close ranks with the Continent for several reasons: the fear of being driven from the European market by the Germans, the need for a bigger market for Britain's rising capacity, the fact that Western Europe is the fastest growing major market in the world.

West Germany would like nothing better than a wide-open European market. And Chancellor Adenauer is convinced that Europe must unite to survive in a world of "super powers," in whose ranks he expects someday to see China and India.

Almost every French government since 1945 has seen the value of closer links between French and German industry, and the need to strengthen the French economy by gradually exposing it to outside competition. Also there is a growing feeling that if France is to maintain any influence in Africa, it must attract heavy investment from all of Europe.

According to present planning, the Common Market and associated free trade zone might work something like this:

Under the Common Market, all tariffs would be eliminated in 12 years, with a possible extension to 15 years. Each of the six nations would cut rates by 10% one year after the Common Market treaty went into effect. Five more 10% cuts would follow through the next seven years, making a total reduction of 60%. The remaining 40% would disappear within seven years. Quotas would be abolished. In the end, the only real protection left for the six members would be a common tariff against the rest of the world.

The common tariff would not apply to those countries that joined the associated free trade area. Members of this group would have free entry into the Common Market and would give The Six free entry into their markets.

Agricultural products and foodstuffs might be excluded from this freedom of trade. Britain wants to maintain its preference on these goods because they represent about 90% of Commonwealth exports to Britain.

There would be another difference between the Common Market and the associated trade zone. The Common Market plan calls for sweeping away all barriers to the free movement of goods, services, labor, and capital. That will require removal of economic disparities that arise from different taxation, social legislation, fiscal policies in the six nations. The theory is that the six nations cannot work well together if each adapts conflicting policies.

To help companies hurt by the new competition move into other fields of manufacturing, there would have to be a special investment or relief fund.

If such a structure can be put together in the next 15 or 20 years, the entire world business community will feel the results.

Eventually, the whole of Western Europe might bargain as a unit for reciprocal tariff reductions. The group might help to lower world tariffs—or, on the other hand, it could yield to internal pressures to keep the common tariff high. There might also be a tendency to avoid competition within the area by the formation of huge cartels. But the chances are that such cartel agreements would be of a stand-by nature, as in the Coal-Steel Community, to come into effect only if worldwide depression threatened.

The European Common Market and trade zone might well encourage development of regional trading arrangements. Already, the French and Belgians are talking about "Eurafrica," a customs-free bloc combining French and Belgian dependencies in Africa with the European organization. The devices like the "Hague Club," a multilateral payments agreement linking seven European nations and Brazil, may well set a pattern for wider Latin American trade and payments arrangements with Europe. (see Financial Digest on another page in this issue).

For the world's exporters generally, the Common Market plan might cause some difficulties at first. On the other hand, to whatever extent Europe gains efficiency and economic health, businessmen everywhere stand to benefit. ●

Compare . . .	Europe*	U.S.A.
. . . population	240-million	165-million
. . . gross product	$178,000-million	$391,000-million
. . . exports (to outside world)	$15,500-million	$15,500-million
. . . steel output	77-million tons	105-million tons

*Six coal-steel community nations and Britain, Switzerland, Austria, Norway, Sweden, Denmark

Data for 1955

Highway cut removes 7.7-million c. m. from these California hills—another project that is . . .

Changing the Face of America

IF you have travelled in the U.S.A. during the past year, you have seen it: the most spectacular construction boom in history, literally changing the face of a nation.

Physical construction is more than ever the dynamic factor in the American economy. Construction's demands on manpower, materials, money, and machines can be felt throughout North America—and even the world.

This month, the U.S.A. concludes its first "$400,000-million year." Of that total gross national output of goods and services, $44,500-million consisted of new construction, with an additional $15,000-million of repair and maintenance. This massive investment spreads throughout the economy: The cement maker benefits, and so does the paint manufacturer, the railroad man, and the importer of furnishings for a new home.

Looking ahead to 1957 and beyond, most economists see construction continuing as one of the most important generators of good business. Next year, an estimated $47,500-million will be spent on new building. And 1960 may see construction at over $55,000-million.

Consider, for example, the new American highway program. In 1955, about $4,520-million was spent on new roads; this year that figure shows a 14% increase. Now the Congress has passed a new highway act. Over a 13-year period, federal, state, and local spending on roads is expected to range from $6,000 million to $12,000-million yearly. The most dramatic part of the program calls for 66,000 kilometers of new "superhighways."

Could the U.S.A. be building its roads and factories too fast? Some economists are concerned, and they are especially watching the high rate of industry spending for new plants, and residential housing, which has dropped off a bit this year. Their worries are over the short-term outlook: It is possible, they say, that American business could overestimate its immediate needs of new productive capacity; and that home builders could produce too many higher-priced homes.

On the other hand, the demonstrated needs of the nation to meet rising population—and also shifts of population from one area to the other—indicate to others that the U.S. may not be building enough.

Meanwhile, the 1957 outlook is good. The present construction boom is bringing shortages (of structural steel, or highway engineers) and rising prices (prices of construction machinery have risen faster than any other type).

The construction industry in the U.S.A. is not one that consumes many goods from abroad. Nonetheless the U.S.A. often imports such bulk commodities as cement, certain kinds of steel, window glass, marble, woods. In time of a temporary or local shortage, or because of a price advantage, the foreign supplier makes a sale.

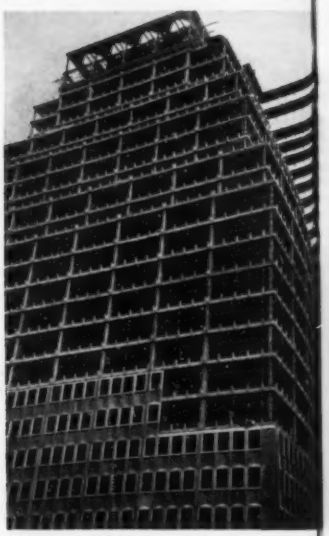
Despite the confusions of the Buy American Law, foreign suppliers can win government contracts for electrical equipment. And recently an Israeli firm sold insulation material to a huge new shopping center. Many a lumber dealer in the U.S.A. today stocks imported woods, for interior work in new homes. Occasionally a new construction technique from overseas, or even a machine, finds a place in the construction industry.

Finally, whether or not an import actually goes into the building of a new office or home, the alert importer can often supply a piece of equipment to the office, or furnishings for the home.

Turn the page for a picture report on America's construction boom.

The Changing Face of America *(continued)*

HOMES: More Americans, with higher incomes and larger families, are trading city apartments for new homes in suburbs (right). The U. S. population is growing by 2.8-million yearly, and past six years have seen an average of 1.2-million new homes built each year.



OFFICES: Cities, as well as rural areas, share in nation's face-lifting as new offices (like this one with aluminum curtain walls in New York) rise on nearly every city block. Value of new office construction rose about 25% this year over 1955.

FACTORIES: To keep up with technical progress and growing demand, industry has launched largest capital investment program in history. This year, industrial building jumped 33% ahead of 1955, and 1957 plans are equally ambitious. Shortages of steel, credit, may slow growth.

POWER PLANTS: "Electric living" has pushed sales of power to 529,000-million kwhr. yearly. Utility industry says it must spend $4,000-million on new capacity in 1957, on such plants as the St. Lawrence power project at right, shared by Canada and the U. S.

SHOPPING CENTERS: The march from the cities encourages construction of huge (up to 90,000 sq. m.), multi-store shopping areas, drawing customers from many miles away. 2,000 are operating now, and another 2,500 are planned.

SCHOOLS: Nearly every American town is buying land, drawing up plans for new schools—to educate record numbers of children. By 1959, the nation will need 476,000 new classrooms—and must increase today's rate of school construction by 73%.

Management at Work . . .

. . . in Mexico

Antonio J. Bermudez (above) celebrates an important anniversary this month. On Dec. 1, 1946, he became director general of Petroleos Mexicanos, a government oil monoply that each day was sinking deeper into corruption, inefficiency, trouble.

Today Pemex is a lot more healthy than it was in 1946, or even in 1938, when Mexico nationalized its oil industry.

Last year was Pemex' best. This year, oil output will climb to 100-million barrels; reserves are rising; drilling operations and refining capacity are increasing. And just a few weeks ago Pemex won a 20-year contract to supply natural gas to the U.S.A.

Yet Pemex and Bermudez are struggling to keep up with rising demand in Mexico, now the world's sixth largest consumer of oil. Pemex is held to a rigidly uneconomic price policy, has not been allowed a major price increase since 1949. Last year, the company had to import $70-million worth of oil products, and sell them at a loss of $21-million.

Mexicans, foreigners, oil men, and economists still argue whether Mexico would have been much better off if it had not nationalized oil. But there is no argument about the job Bermudez has done.

At 60, he serves Pemex like a priest his orders. A wealthy businessman and politician, Bermudez has never accepted a centavo of his $9,600 salary—instead he devotes it to benefits for Pemex employees. Don Antonio works at a pace that would exhaust younger men, operating more as a team captain than a top administrator. Almost every weekend you will find him flying around Mexico to look at Pemex installations and talk to Pemex employees. They, and oil men everywhere, respect him for strict honesty—and courage.

. . . in Lebanon

Emile Bustani (above) stands astride two worlds. He is chairman of Contracting & Trading Co., Beirut, known as "CAT" and reputedly the largest Arab-owned company in the Middle East. Bustani is a politician, and an Arab nationalist. Yet his business, whether it is building pipelines for oil companies or selling stoves to Bedouins, is intimately bound up with Western business.

Bustani, 47-years old, started contracting in 1938: His first job was a $200 bath for an Iraq Petroleum Co. employee. After war-time troubles, it was an IPC pipeline contract that made CAT's reputation for efficiency and quality. Bustani's men dug the trench in record time, won a $280,000 bonus. Since, the company has built apartments in Beirut, reservoirs in Kuwait, irrigation projects in Iraq, —a total of over $100-million in construction business. And its trading empire stretches eastward to Pakistan, west to Libya.

Further deterioration of relations between the Arab and Western worlds could spell disaster for CAT. Bustani knows this. He believes that Westerners and Arabs can—and must—work together. Outsiders agree that CAT is proof that they can.

. . . in Germany

Hans-Guenther Sohl (above), president of August Thyssen-Huette AG, Duisburg-Hamborn, has had a busy year. Under his leadership, the Thyssen steel company has, among other things, (1) increased sales by about 37%; (2) received the first industrial credit ($10-million) ever made by the U.S.A.'s Export-Import Bank to a private German company; (3) set up a joint operation with U.S.A.'s Armco Steel Corp. in Germany; and (4) bought its own ship to carry coal direct from the U.S. to Thyssen plants in the Ruhr.

Sohl himself has been elected chairman of Germany's Federation of Iron & Steel Industries, and has received his government's highest civilian decoration.

Germany's industrial drive gains a great deal from younger management men like Sohl. Now 51, he was trained as a mining engineer and began his steel career with Krupp in 1934. In 1948, he joined August Thyssen-Huette; in 1953 became head of the management board.

He spends a lot of time traveling and working on his forte; long-range planning. That planning ability has helped to almost completely re-establish the prewar Thyssen operation. ●

Compiled in BUSINESS WEEK and from McGraw-Hill World News.

COMING!

THE NEWEST NEW CARS IN 20 YEARS!

All the world will see them soon. Chrysler Corporation's 5 great new cars of the *Forward* Look for 1957. Cars with more major advancements for your riding and driving pleasure than any automotive manufacturer has ever introduced at any one time before. No other cars have so fully deserved the term *"completely new"*.

In styling they introduce a thrilling new concept of beauty in steel. It's a new shape of motion with long, low sweeping lines that will again set the trend for years to come.

In riding comfort the new *Forward* Look cars surpass even the "limousine" ride for which they've long been famous. A totally new idea in automotive design results in the most pleasantly smooth riding car you've ever dreamed you might own.

In performance, spirited new V-8 engines respond lightning-quick to the slightest touch of your toe. And the magical ease of push-button automatic shifting puts all this might at your finger tips.

And in safety, the new *Forward* Look cars bring you advancements to match their dramatic new power and handling ease. These new safety features will give you and your family new confidence every mile you drive.

These are only a hint of the many brand-new ideas soon yours to enjoy. You won't have long to wait. It's only a short time now until you'll be able to actually see and drive the great new cars of the *Forward* Look for 1957. When you do, you'll be glad you waited for these newest new cars in twenty years.

CHRYSLER CORPORATION, Export Division

Manufacturers of **PLYMOUTH • DODGE • DESOTO • CHRYSLER • IMPERIAL**

Available at sales and service dealers the world over.

HELICOPTER COMMUTING keeps a fast pace for one businessman who knows that . . .

Business Flying Has Come of Age

A few years ago flying executives were mostly sportsmen-on-business. Today, the advantages of flying are so great that management finds itself saying: "Can we afford not to own an airplane?"

Thousands of businessmen-flyers will answer no. The coffee planter in Brazil's Parana; the Canadian mining executive; the rancher in the Australian "outback;" the fast-moving sales manager or president of a multi-plant American manufacturing corporation—all will testify that a personal, or corporate, aircraft has become essential.

The popularity of business flying has grown with the pace of modern business. Areas difficult to reach by train, auto, boat, even by scheduled air lines, are easily accessible. The personal plane promises time-savings, flexibility and convenience, a reduction in executive fatigue and strain.

And those benefits are often just as pronounced in an area with highly-developed transport facilities as an area that depends wholly on plane travel. For example, an American manufacturer located close to a secondary airport across the city from the big commercial airport found traffic and travel time to the larger terminal sufficient reason to own a plane. Other companies have branches that the airlines can reach only by round-about routes and flight changes.

One manager, busy serving customers in a relatively small area, found that a single-engine aircraft slashed travel time by 75% —and increased sales 50% "because we can get there faster and beat the competition."

Large corporations, of course, have been operating private fleets for years. The Arabian American Oil Company, operating regular flights between New York and Saudi Arabia, belongs to the International Air Transport Association. The Continental Can Company, adding to its fleet of five piston-engined planes, has ordered three Fairchild M-185 jet transports, which will cruise at 880 kilometers an hour with eight passengers. Vickers Viscount turboprops have been ordered by three American firms.

The airlines carry more passengers, but there are 10 times as many business planes in the air than airliners. Most of these are single-engine planes seating four or five passengers, but the trend is toward twin-engine planes. Over 6,000 business firms now own planes; U. S. business firms alone operate over 20,000 planes, of which about 2,000 are multi-engine

OLD RELIABLE and most popular corporate transport is the Douglas DC-3. Before conversion, used DC-3's sell for around $100,000. This interior was designed to specifications of a U. S. tobacco company.

aircraft. The U.S. Government Civil Aeronautics Authority predicts an 80% increase by 1965, an estimate that is considered highly conservative.

The cost is reasonable. Considering the gain, most executives who use private or company planes think the cost of flying is reasonable. For example, Mason and Dixon Trucking Lines, a U.S. trucker, owns one medium-size plane. In one year, M&D executives made 480 flights. Total distance was 240,000 kilometers. The plane was aloft for 824 hours. Total expense (including pilot, hangar rent, fuel, parts, depreciation and insurance): about $50,000 for the year. Almost half this amount went into depreciation and reserve funds for new engines. Figured on an individual passenger basis, the cost per kilometer was slightly over twice the cost of commercial flights.

For individual businessmen, the cost is harder to calculate. First of all, there is the initial investment. The cheapest actual flying cost is credited to businessmen belonging to flying clubs. For instance, members of the Sky Roamers, a California club with 85 members, average only about 10.40 cents a kilometer for medium-size single-engine flying.

The club idea should be looked into by all individual businessmen who can't afford their private plane. For one advantage, the club benefits by the presence of pleasure flyers.

The Sky Roamers operate as a non-profit stock corporation. A membership share costs according to the class: $450 for a training membership, $650 for lighter planes, more for heavy and two-engine craft. Dues are $10 a month, plane rental $6.50 an hour for a Cessna 170.

Nearly 85% of business planes in the U. S. A. are bought on some sort of lease or financing plan, usually through a local bank. Beech Aircraft recently announced a retail finance plan for U.S. domestic customers. The buyer pays a minimum of $9,000 down on a single-engine Bonanza, for instance, and pays out the balance of $19,950 in 30 monthly payments of $665.

Overseas delivery is not expensive, percentagewise. For instance, Latin American customers can get a business plane flown from the U. S. A. for $500 to $1,000 —and not much more from Europe. But import licenses and currency restrictions can cause delays. Priority restrictions also might come up: Crop-spraying or dusting planes get preference in some countries.

Selecting a plane is no easy task. Major factors to consider: (1) the number of people who will use the plane and equipment they will carry—to determine size; (2) length of trips and terrain—to determine engine power; (3) size of available airfields; (4) speed desired—range is about 280 to 480 kilometers per hour; and (5) cost —initial and operating.

Caution: All airmen say there is no such thing as a "cheap" plane. Safety factors and maintenance can be nothing less than the best.

Aside from company travel, planes are becoming more and

FRENCH JET is first in its class for business flying. Morane Saulnier sells the "Paris" for $300,000.

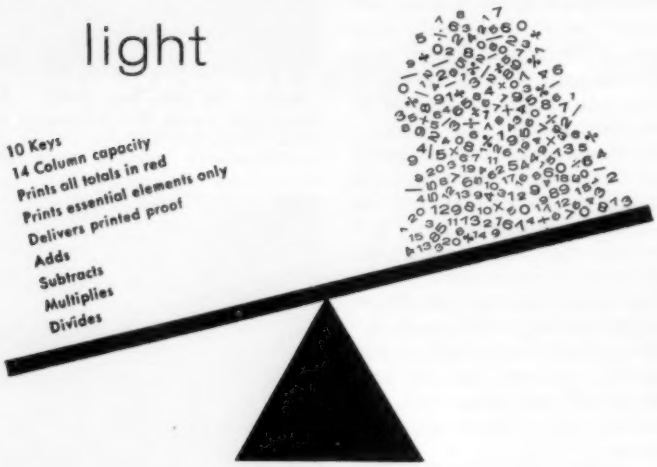
CESSNA 310 seats five. Range, 1,600 kilometers; speed, 350 kilometers per hour. Price: $55,000.

DEHAVILLAND DOVE seats 8 to 11, flies at 300-320 kilometers per hour. Twin-engine craft sells for £33,500.

AMPHIBIAN made by Piaggio in Italy has been approved by the U. S. Civil Aeronautics Administration for business flying. The 250 kilometers per hour Royal Gull sells for the equivalent of about $75,000.

FOUR-JET FAIRCHILD M-185 will carry 8 executives at 880 kilometers per hour. This is first mock-up.

The "99"
makes
heavy
office
workloads
light



The Remington "99" Printing Calculator

The "99" comes to the rescue of businessmen who look apprehensively at the rising costs of office man-hours. Even the first demonstration of this remarkable machine will enable you to envision important savings. See your local telephone directory for your nearest Remington Rand representative. *There are 18,000 Remington Rand Branches and Distributors throughout the world.*

Remington Rand
International
DIVISION OF SPERRY RAND CORPORATION

more a part of the executive's life.

For example, a building contractor in Spokane, Washington (U. S. A.), has announced that his new suburban housing project will cater to the businessman who commutes from home-to-office by plane. The project's 300 modern homes are being built around a 992-meter airstrip. Indication is that daily air commuting is really a practical idea for places where suburban sections are far removed from the city.

Take the case of Detroit industrialist Frederick Matthaei (see picture, page 20). He uses his own private helicopter to commute 56 kilometers to and from his office each day. Time by auto, 50 minutes; time by 'copter, 18 minutes. Cost of plane was $45,000. Operating cost is about $75 for each hour of flying time. This cost is high—but consider the

BEECHCRAFT BONANZA is an all-metal, four-place craft selling for $22,000. Top speed is 310 kilometers per hour; range, 1240 kilometers.

comment of one of Matthaei's associates: "His time is worth $100 to $200 an hour to the business."

W. Henry Scovil, a California certified public accountant, recently bought a new single-engine plane to serve clients in a 400 kilometer-radius. "Right in the middle of my busy season this year, I started taking flying lessons," he reports.

If you decide to fly your own plane, it will take from five to 10

CUBAN BUSINESSMAN Francisco Orue Gonzales (left) takes possession of his twin-engine Apache from the local Piper distributor. The five-seater Apache sells for $34,000.

hours of flight instruction to get off the ground and back down by yourself. Licensing requirements vary from country to country, but they can be stiff. A U.S. license to pilot a fixed-wing private plane requires a total of 40 flight hours, 15 with an instructor and 25 solo —plus physical and flight tests and an examination on civil-air regulations. (Requirements for a helicopter license are the same at present). There is an international committee working on the standardization of pilot licenses. (For information, you can write to the Secretariat General, International Civil Aviation Organization, IAB Building, Montreal, Canada.)

The trend, incidentally, is toward stiffened "visual flight rules"—the simple use of eyes and common sense to avoid collisions. For business flying, the trend points to more training, more expensive navigational aids on company aircraft. Indeed, the rapid increase of planes in the air, and the coming of the "jet age," will force private fliers to use better equipment, to file more precise flight plans, and to energetically promote better facilities for flying everywhere in the world.●

Compiled from reports in Aviation Week, Fleet Owner, Wall Street Journal, Business Week, The Economist, and other sources.

A table of specifications of U.S. planes designed for business travel will be sent to interested readers. Write to MANAGEMENT DIGEST.

ADVANCE

The World's Largest Exclusive Fluorescent Lamp Ballast Manufacturer

Satisfy more demands for fluorescent lamp ballasts with the Advance line, the world's largest and most complete line of fluorescent lamp ballasts. Make more profit too, because with a complete line you can satisfy every need and make more sales.

• • •

Advance offers manufacturers, specifiers, installers, and users of fluorescent lighting a fluorescent lamp ballast that is engineered and built to the highest standards, ballasts recognized world-wide for outstanding performance and dependability. Performance and dependability that has made Advance the world's largest exclusive manufacturer of fluorescent lamp ballasts.

Whether distributor or user, write Mr. Theodore Ley, Export Mgr. for descriptive literature.

The Heart of the Lighting Industry

ADVANCE TRANSFORMER CO.

CBM CERTIFIED

World's Largest Exclusive Manufacturer of Fluorescent Lamp Ballasts

2950 No. Western Ave. Chicago 18, Illinois, U.S.A.

Cable Address "Adtrans"

This AIR-RAID Damage Is Constant Problem In Industry

IN many industries, atmospheric dust is a daily menace to high-level production and effective quality control. The need for clean air is felt "across the boards"—in industrial air conditioning, drying operations, plant ventilation, product finishing, control of bacteria and mold spores, and cooling of electrical equipment.

Only American Air Filter offers a complete line of air filtration equipment—from the largest, completely automatic electronic precipitator to the simplest unit viscous filter—to meet the complex air cleaning problems of industry.

You can depend on AAF's 30 years of "on the job" experience in the analysis of your problem and the selection of the right filter for your requirements. Send for the name of your local AAF representative and free booklet, *Dust Dollars and Dividends.*

American Air Filter

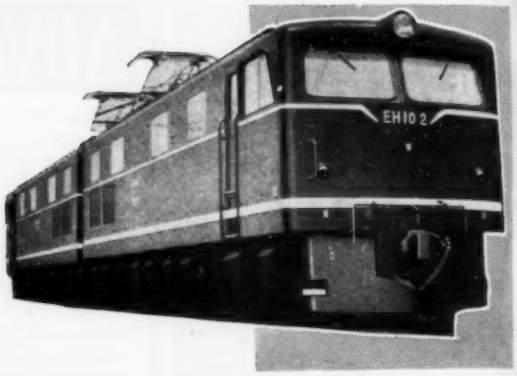
COMPANY, INC.

255 Central Avenue, Louisville 8, Ky., U. S. A.

AIR FILTERS—ELECTRONIC PRECIPITATORS—ROTO-CLONES

Cable Address: AMFIL

1,900 HP Diesel Electric Locomotive



Type EH10 Electric Locomotive (for Japan National Railways)

HITACHI
LOCOMOTIVES

for Various Industries, Agriculture, Mines and Other Transportation Service

Steam Locomotives
Passenger Cars
Tank Cars
Trolley Buses

Electric Locomotives
Electric Cars
Diesel Cars

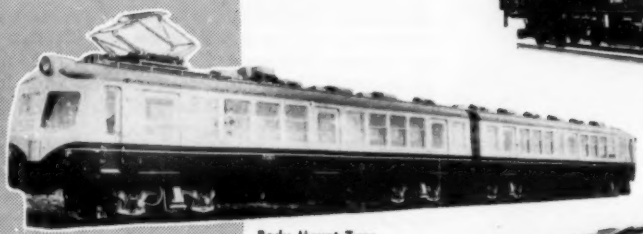
Battery Locomotives
Freight Cars
Gasoline Cars

Hitachi, Ltd.

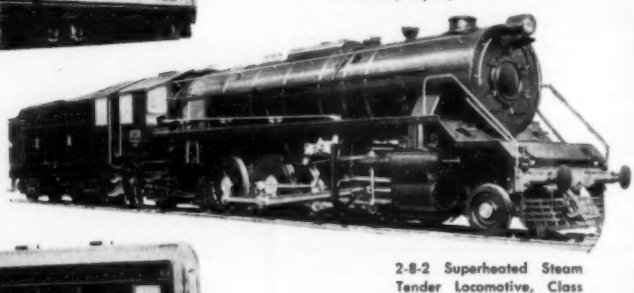
Tokyo Japan

Cable Address: "HITACHY" TOKYO

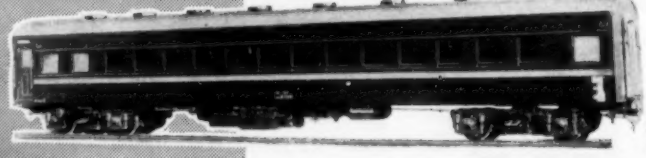
Diesel Hydraulic Car (for Rumoe Railways, Hokkaido, Japan)



Body Mount Type Electric Car (for Sagami Railway Co., Ltd.)



2-8-2 Superheated Steam Tender Locomotive, Class WG (for Indian Railways)



Second Class Passenger Car (for Japan National Railways)

World Management at Work

TRADEMARK COUNSELLER John Schneider of Abbott Laboratories (U.S.A.) studies the output of a digital computer he used to scramble combinations of letters into medical-sounding names. Abbott goes to the computer when the imagination of its trade name department fails to keep up with output of new drugs. Another laboratory used its computer to prepare a 200-page book listing 42,000 possible product names. Human beings still have to program the computer and sort the results. (*Chemical Week, Oct* 13, *p*118)

•

ENGINEERS are often poor readers because they don't know how "to shift gears," a U.S. Navy study reveals. The engineer's reading speed is geared to technical matter that requires slow, careful study. But only a fraction of his reading matter is of this nature. Two bad reading habits: vocalizing and looking back. A Navy reading program has increased its engineers' general reading speed by 70%. (*Personnel, Sept p*141)

•

RECORDING REPORTS on tape, and sending them to field representatives, is paying good dividends to a textbook publisher.

The company found that tape recordings from headquarters, spoken by the president or the sales manager, bring a touch of company personality and enthusiasm that is lacking in the usual written memoranda that field salesmen and other representatives receive.

After they have played the tapes on their portable recording machines, field managers can erase them—and record their own reports for management. The company says that information comes in on the tapes that it never received before: The tone of a man's voice tells how he feels about what he is reporting.

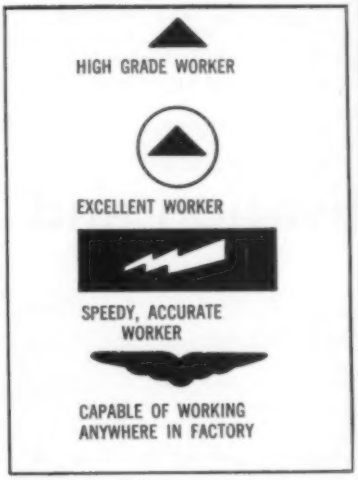
•

MANAGEMENT - CONSULTANTS in Britain have banded together into a Management Consultants Association.

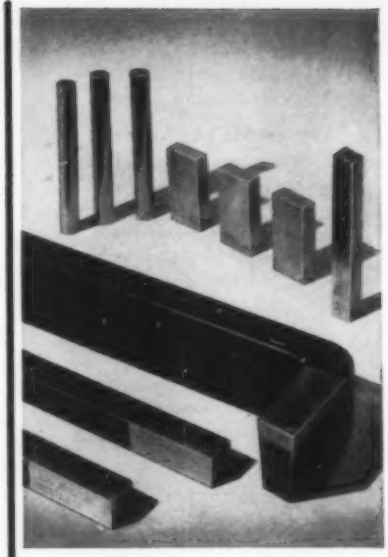
The association is supposed to exchange information on management problems and conduct joint research. But the four firms—Urwick, Orr and Partners; Production-Engineering; Associated Industrial Consultants; and Personnel Administration—say they will continue to compete for business.

In a joint statement, the firms said that "accelerating technical progress is demanding rapid solutions to fresh problems." (*Times Review of Industry, Oct, p*46)

•



SLEEVE MARKERS for seasoned workers are used by John Peck & Co., Ltd. of Liverpool, England. Appraisal is up to the foreman, and no rank goes with the markers. But each marker carries a financial bonus. Production is reported rising, turnover and absences falling since the program was started. Removable arm bands with chevrons are used with learners. (*Factory, Oct, p*137)



HEAVIER FEEDS
DEEPER CUTS
DOUBLE OUTPUT

You can reduce machining time, even double and triple production with Deloro Stellite Grade 100 cutting tools. They will not burn even when RED HOT. They're tougher than carbides . . . and have a high resistance to the abrasion of cast materials and to edge cratering caused by tough steels. Deloro Stellite Grade 100 lasts longer and machines faster than steel tools. Regular grinding wheels sharpen them. Their cost is moderate.

Write Today For Booklet "Machining with Deloro Stellite"

DELORO STELLITE
BELLEVILLE ONTARIO

How to appraise the individual supervisor — and help him

High Skill **High Motivation** **"He couldn't be better."** Excellent when working at a high level. No problem here. Put him on his own, depend on him when there is trouble. Let him learn by handling increasing responsibility.	**Medium Skill** **High Motivation** **"He's capable, but something is lacking."** He'll be above average because he'll make up in effort what he lacks in ability. Additional job information may yield unexpectedly big returns.	**Low Skill** **High Motivation** **"He tries awfully hard, but . . ."** He tries to make good but the job is too big for him. Painstaking instruction and management orientation can maybe push him over the line. Don't overlook possibility of misplacement.
High Skill **Medium Motivation** **"If he'd try a bit harder, he'd be fine."** He'll do an above-average job—but he could be better. Stimulate his ambition, tell him his prospects are bright.	**Medium Skill** **Medium Motivation** **"You'd call him Joe Average."** He is your average supervisor doing an average job. It will take both job training and encouragement to improve him.	**Low Skill** **Medium Motivation** **"I could do the job quicker by attacking it myself."** He is on the borderline. Easier assignments have a better chance of being well done. He needs a basic reorientation in job responsibilities.
High Skill **Low Motivation** **"He knows the job, but doesn't apply himself."** He'll just drift along, performing below his potential. If you can't convince him there's a future, he's wasting his time, maybe yours. Try steering him to future skill needs.	**Medium Skill** **Low Motivation** **"I'm keeping him on because there's nobody else."** He's merely marking time. Chances are he is misplaced in his job. Try to find out what he's really interested in doing — and help him do it.	**Low Skill** **Low Motivation** **"I've got to do something about him."** This man is at the bottom of the list. He's a gamble — and in a key job will undoubtedly cause a breakdown. Consider transfer to job where his skill is relatively higher.

Studying Motivation and Job Skills

Digested from FACTORY, Oct., p84

Skill and motivation are the Siamese twins that must be figured together in any supervisory-improvement program. The heart of the supervisor's problem is usually a need for better motivation, or more job skills, or both. Many attempts to improve supervisory performance fail because management neglects one of the two factors.

The chart at the top of this page gives the combinations of these two factors. Each supervisor "type" is identified by a typical comment that an executive might make. In each case, the line of action depends on which factor needs improving.

Your interest is job improvement, not improvement in the abstract. A sound training scheme should have three foundations:

Remove obstacles blocking growth. In one case, this means encouragement; in another, guidance.

Improve job skills. Help the supervisor to learn how to make decisions and to tap human resources.

Modify the job situation. Get the maximum from the supervisor's strength, the minimum from his weakness.

Each supervisor must be appraised as an individual, but the supervisors as a group must also be appraised.

Supervisors are not usually in a position to anticipate the changes coming their way. Consider the future supervisory needs in your own company. What are the company plans for expansion, new products, marketing, production changes, automation?

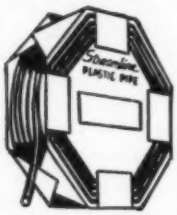
What is the potential of the supervisors as a group? You can get important information from the personnel files. Check the average age, the pay level, education, and length of service of the group. Compare these figures with other plants if possible. A comparison of pay scales, for instance, might turn up a reason for dissatisfaction. The age figures may show wide gaps or too many "old-timers."

The supervisor's job is chang-

Products of the MUELLER BRASS CO.

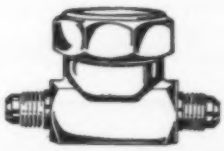
MUELLER BRASS CO. STREAMLINE PRODUCTS

for heating and plumbing—refrigeration and air conditioning



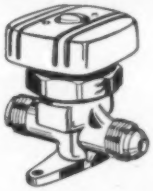
FLEXIBLE PLASTIC PIPE

STREAMLINE SOLDER-TYPE FITTINGS

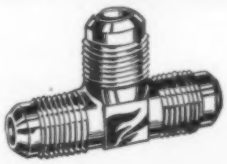


LIQUID INDICATORS

PACKED LINE VALVES



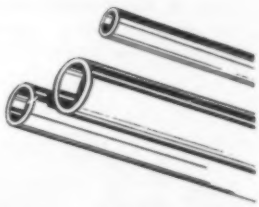
DIAPHRAGM LINE VALVES



FLARE FITTINGS

DRIERS-STRAINERS

FORMED COPPER TUBE



STREAMLINE COPPER TUBE

From the Mueller Brass Co. you can get a complete line of products for all heating, plumbing, refrigeration and air conditioning needs ranging from valves to formed copper tube assemblies. Mueller Brass Co. is the originator and exclusive manufacturer of Streamline® solder-type fittings and copper tube for drainage and supply plumbing, industrial heating and piping.

Mueller Brass Co. valves, fittings and accessories for mechanical refrigeration and air conditioning are of the highest quality in material and workmanship and are machined to the highest refrigeration standards. Write today for full information.

MUELLER BRASS CO.

PORT HURON 29, MICHIGAN, U. S. A.

Mueller Brass Co.
Port Huron, Michigan, U.S.A.

Please send me the following catalogs:

- ☐ S-156 Streamline Heating & Plumbing Products
- ☐ R-156 Refrigeration and Air-Conditioning Products
- ☐ Streamline Flexible Plastic Pipe

Name:_____

Company:_____

Address:_____

Cable address: Streamline

176

ing. Management may find that the average supervisor is inadequate in a few years.

Technological progress is outdating the maintenance man who depends on "baling wire and chewing gum."

Staff experts are making life difficult for the older man who thinks he knows it all.

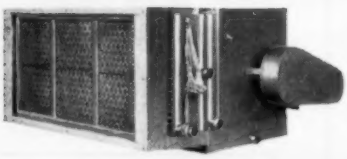
Better-educated employees are rebelling at the whip-cracking supervisor.

More expensive machinery is making bad decisions more costly.

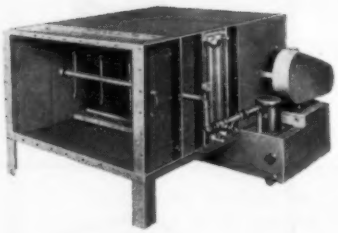
To make sure that supervisory training is "job centered," ask yourself these questions:

Is time spent on helping supervisors handicapping current production? Does every part of the program grow from a specific job need—current or anticipated? Does each supervisor understand the relationship between his training and his job goals? Does each supervisor know his strong points? ●

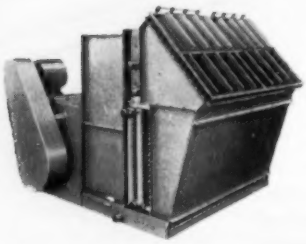
American Blower Air Conditioning Units for Industrial and Public Buildings



Type A Air Conditioning Units for summer cooling and dehumidifying, and for winter heating.



Type S Air Conditioning Unit combines the washing, air cleaning, humidifying and evaporative cooling of an air washer with the cooling and heating of the basic unit conditioner.



Type AB Multi-zone Conditioner is furnished in one arrangement for either horizontal or vertical air flow.

• • •

We manufacture air handling and conditioning equipment for use in air conditioning, heating and ventilating installations. Also the other products mentioned below. Bulletins furnished on request. American Blower Corporation, Detroit 32, Michigan, U.S.A. In Canada, Canadian Sirocco Products.

Request Bulletin No. 8527

Fans • Blowers • Fluid Drives • Unit Heaters • Dust Collectors • Air Conditioning
Centrifugal Compressors • Mechanical Draft Equipment • Refrigerating Machines

AMERICAN BLOWER

Division of American-Standard

Plan Your Meetings

. . . if you want results. It takes good management to run a useful meeting.

Digested from METALWORKING PRODUCTION, Oct 5, p1613

It takes good management to run a meeting. Since the men who attend try to be successful managers themselves, they will expect to see evidence of good planning behind the meetings.

Experience points to six areas where planning must focus:

1. Select appropriate subject matter. The best place to begin is to find your most pressing problem. Are costs rising too rapidly? Is quality falling off? Define the problem and list all aspects.

2. Plan the meetings. The president or manager may want to explain the overall problem. After this, you may want to break the group into smaller units for discussions. If prepared material is used, the case-study method might be used. The technique should be adapted to the particular goal.

3. Get good speakers and leaders. Speakers must have something to say and know how to say it. They can be company officials or they can come from the outside—from trade associations, suppliers, customers, etc. Before inviting a speaker, check with someone who has heard him speak before. You can tactfully suggest the use of visual aids.

4. Pick the place with care. If there is a comfortable conference room or canteen, use it. Plan for the number attending; and plan how to break up the meeting into discussion groups. Some companies find it's best to hold meetings away from the plant.

5. Make one person responsible. The training director is the logical man to organize management meetings. But the subjects should be selected by people who know what the pressing problems are. It is wise for the highest interested person to participate.

6. Check reactions to the meeting. Within a few days, while the memory is still fresh, check with the participants. Ask about the good points as well as the bad. ●

The Idea

That Put Radio on Wheels

The vibrator, developed for commercial use by Mallory 26 years ago, freed automobile radio of the nuisance and cost of special batteries . . . made all mobile communications practical for the first time.

THE MALLORY VIBRATOR marked a milestone in the progress of automobile radio. It made it possible to run the radio from the car's storage battery, just like headlights and ignition . . . without need for short-lived, costly, extra batteries.

That was 26 years and some 60 million Mallory vibrators ago. Mallory was *first on the market* and has remained *first in the market*. Manufacturers of automobile radios use more Mallory-made vibrators for original equipment than all other makes combined. Radio service men prefer them by an overwhelming majority for replacement work. These vibrators have established high standards of dependability . . . to assure you listening pleasure as you drive, and to contribute to the reliability of communications in police cars, taxicabs, fire-fighting apparatus and other mobile equipment.

Latest Mallory developments include a completely different, revolutionary vibrator design that nearly doubles service life and further improves reliability . . . and hum-hushing refinements that almost totally abolish mechanical vibration. Both of these important improvements, moreover, are offered to manufacturers at no increase in price.

Vibrator development typifies Mallory's research ingenuity and precision production in electronics, electrochemistry and metallurgy . . . serving manufacturers throughout the world.

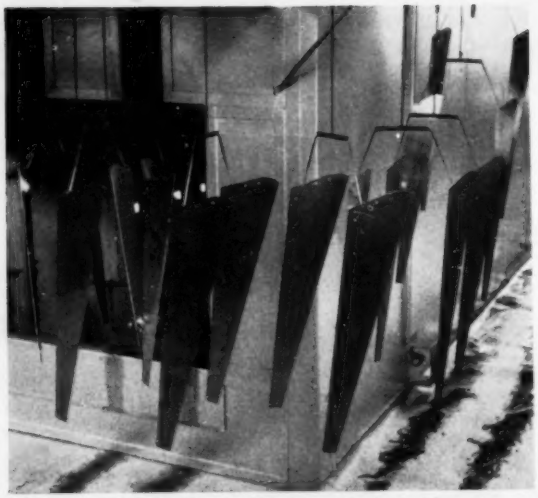
P R MALLORY & CO INC

MALLORY

SERVING INDUSTRY WITH THESE PRODUCTS:

Electromechanical • *Resistors, Switches, Tuning Devices, Vibrators*
Electrochemical • *Capacitors, Rectifiers, Mercury Batteries*
Metallurgical • *Contacts, Special Metals, Welding Materials*

P. R. MALLORY & CO. Inc. INDIANAPOLIS 6, INDIANA



CONVEYOR SYSTEM for finishing blades of hand saws has replaced tedious hand operations and . . .

. . . saw handles are now cut out in one step by "automated" controlled-pattern cutter and . . .

Overhauling a Company for

Digested from BUSINESS WEEK, Oct 6, p104

The new machines and methods for making hand saws (above) are one part of a top-to-bottom overhaul that has turned a Philadelphia (U.S.A.) firm into a profit maker in just one year. A year ago last November, Henry Disston & Sons, Inc., a family concern making industrial and commercial hardgoods, became H. K. Porter Co.'s Henry Disston Div.

Porter has changed the management, product line, equipment, and production techniques. Badly needed cash was brought in.

Annual sales for this year are estimated down 25% (from $25- to under $20-million) from 1955. But by August, the company showed a profit of $100,000 for the month. The paring of Disston's product line accounts for the sales drop. A company spokesman said, "We're not looking for high volume. We're looking for profit." He added, "We might do more paring."

The first change that Porter made was in the management. An assistant manager from another division, Eugene Salinger, was made general manager of Disston and a Porter vice president. Assistant general manager Arthur S. Nippes was hired for the job from the outside—he was formerly works manager of a machinery plant. A production specialist, Nippes concentrates on plant operations and personnel. Salinger keeps his finger on liaison with the parent company, matters of policy, sales, and finances. It is a practical management division.

Not one of the six or seven top staff men now running Disston was in his present job a year ago. A majority are newcomers. And the holdovers are in new jobs.

Lack of cash was the big trouble with the old company. Outmoded equipment and production techniques ran the production costs above sales revenue. Porter put up $500,000 for new equipment, which is just now beginning to arrive at the plant. More equipment will be bought later. With much of the plant in the change-over stage, production continues to roll through on aged machines driven by overhead belts—while workmen are busy installing compact, self-powered metalworking machines.

Production lines are being modernized and shortened. Hand saws, for instance, formerly traveled a total of 1526 meters through several buildings. Now production is being drawn into one building, with production travel cut to under 300 meters.

Management concentrated on the unprofitable part of the sales —about $10-million out of the $25-million total. Products for which there was little demand were dropped; some items in the warehouse had gone a year with no orders.

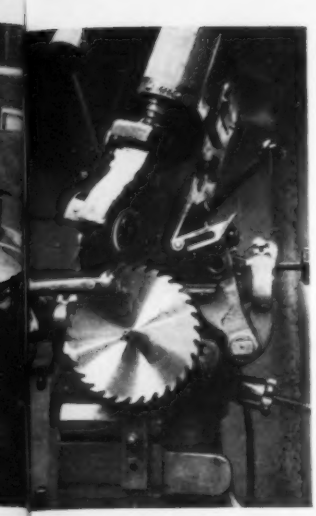
Porter looked at the production costs of other items. Some, clearly out of line, could be cut; others called for price increases.

The cutbacks were applied chiefly to individual items, rather than full product lines. For example, the handles used for hand saws were reduced from over 20 different types to nine.

Two major lines, however were dropped—armor plate and steel. The armor plate business flourished only during the war. The steel mill was old and decrepit: "We found it would cost us $3.5 million to renovate the steel mill," Salinger points out. "And then we'd still have had a marginal plant on our hands."

Another product, power saws, is being revived. Porter thinks that the now-profitable company can beat the competition that forced Disston out of this business.

With the production setup changed, inventories have been reduced from the $5 to 6-million level to about $1.5-million. A related problem, length of in-process time, is being tackled as the new machinery arrives.



automatic blade shapener re-
s man with hand-file.

profit

Such drastic changes created a morale problem. Production workers dwindled from 1,500 to 850; the clerical and administrative force is down by about 25%. But Salinger thinks the old staff was unnecessarily large.

Summing up the changes, Salinger says, "We've dropped a lot of unprofitable business, but we'll get sales to cover all that and more. And it will be profitable business—all of it."

Disston's rejuvenation is, of course, in many ways its own unique story. But in a more general way, the same problems were recently described in the *New York Journal of Commerce:*

The pressure of rising costs is forcing a growing number of U.S. companies to take a new look at their product lines. The basic problem is that it is not always possible to pass along higher production costs to the consumer.

Making changes, however, is not always as easy as it may appear. For one thing, change comes hard. Another reason is that a change often means that a previous decision might be criticized.

Finally, key executives can get attached to certain phases of the firm's operations and tend to resist change, even though needed for the health of the firm. ●

▶ YOU AND YOUR PERSONAL AFFAIRS

If you are like most managers these days, you spend a lot of your private time in business-like activities. Let's take a look at "office equipment" from the personal viewpoint.

Executive desks are looking more and more like home furnishings. For your "den" or office at home, you might do well to check with a supplier of office equipment as well as a furniture merchant. Equipment companies are employing their own designers. Their desks are functional, modern, and simple in design. Most such desks are available in many different combinations of fine woods and finishes. And if you need a hard top to work on, almost indestructable materials such as Formica can be specified.

You are familiar with the featherweight portable typewriters. They weigh about 3.5 kilograms and stand a little over 7 centimeters high—and cost about $70. If you travel a lot, this size has the big advantage of weight. It does not boast "big-typewriter" features. The next size, usually called a standard portable, weighs in the neighborhood of 6.5 kilos and sells for about $125. The trend here is to incorporate as many of the features of the office typewriter as practical.

If the extra weight is not an inconvenience to you, you will want to check for such features as the automatic tabulator, automatic ribbon reverse, paragraph indentation device, line spacers, etc. A few slightly heavier typewriters are also built. The point to keep in mind: the heavier the machine, the more precision and extra features you should expect. It depends on what you want to use the typewriter for.

Portable dictating machines are competing with the portable typewriter as a personal companion. The self-powered machines weigh 3.5 to 4.5 kilos—about the same as the featherweight typewriter. Some of the newer recording discs can be folded to fit into a standard air-mail envelope. And in most large cities, it is relatively easy to find a secretary to transcribe what you have dictated, say on a plane.

The portable adding machine is another office machine that can be used for personal business. Excellent machines weighing under 3 kilograms are being put on the market at the $100 level.

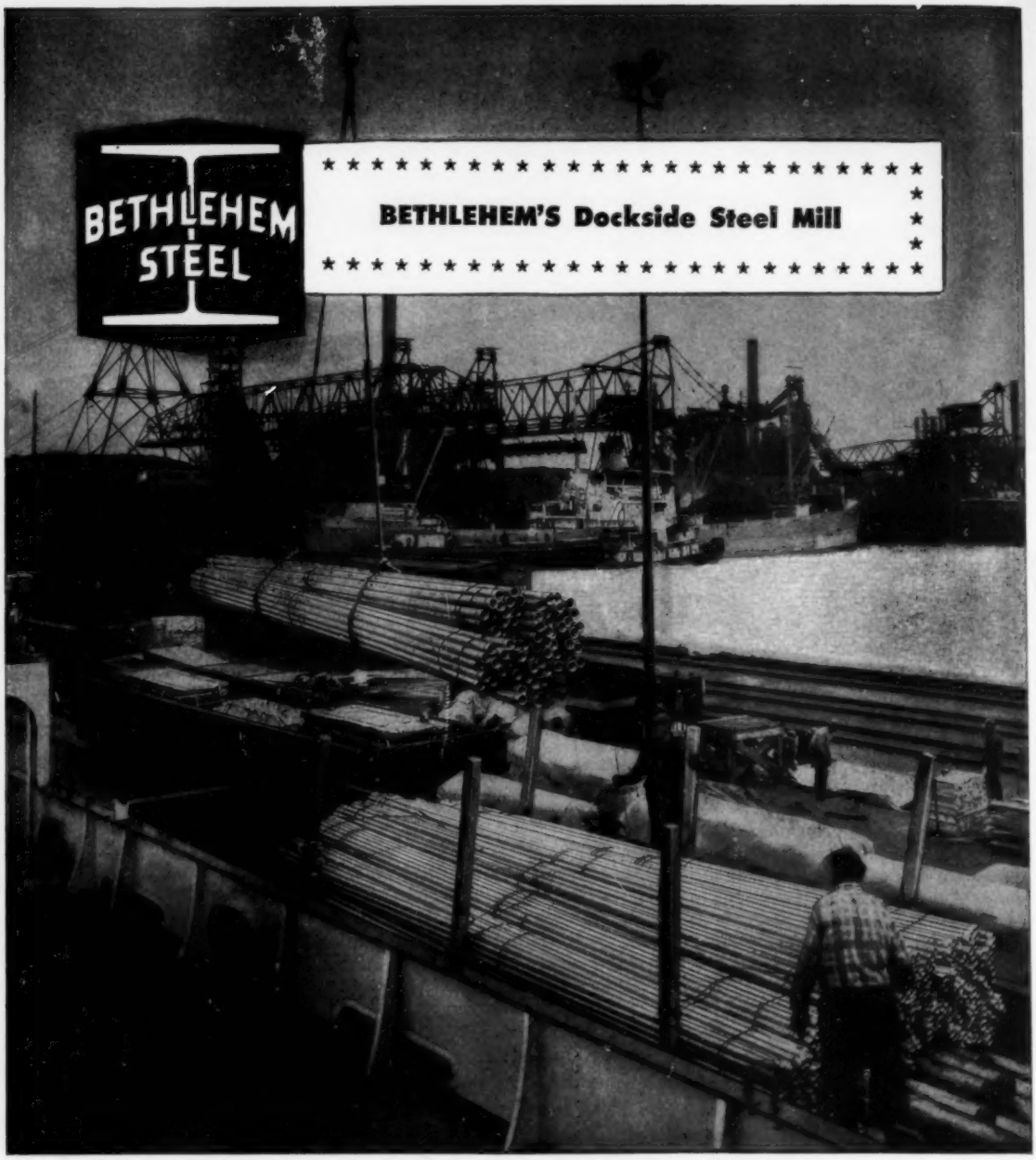
Another items of personal interest: an office intercommunication system—for the home. For large houses, the two-way voice boxes can save a lot of walking and/or shouting. Some of the systems are wireless—they plug directly into the house electrical system. The cost: $55 per station, plus $7.75 for extra speakers.

●

Current research by office equipment companies indicates what kind of equipment you can expect in the future for office and home use.

Around the corner is the television-telephone. With this instrument you will be able to check goods and parts at the source—as well as see the person you're talking to.

Office intercommunications systems will use atomic-powered desk microphones with batteries that last 25 years. Internal reports will be sent over a photo-facsimile system. Inventory-control charts will work with electronic impulses.



The world's largest steel mill located on tidewater is Bethlehem's great Sparrows Point plant in the Port of Baltimore, U.S.A. Loading products for export at this plant has two advantages to the purchaser.

First, it eliminates the delays caused by long overland freight hauls.

Second, it minimizes the possibility of damage by greatly reducing the handling required.

Our Sparrows Point plant has served the export market for years. With its tidewater location, it can quickly put your order on the way – thereby saving days or even weeks. Moreover, we have three plants on the Pacific Coast of the U.S.A. to help serve Far Eastern markets. Bethlehem Steel Export Corporation, 25 Broadway, New York 4, U.S.A. Cables: "BETHLEHEM, NEWYORK."

Bethlehem supplies steel to world markets in all forms, including

BARS ★ ALLOY STEELS ★ TOOL STEELS ★ PLATES ★ STRUCTURAL SHAPES ★ SHEETS ★ STRIP ★ TIN PLATE ★ PIPE ★ WIRE PRODUCTS ★ RODS ★ RAILS

Offices and representatives in all principal cities of the world

806EP

Dyes and Pigments: A Colorful Future

COLOR helps sell a product. Dye and pigment industries find this means a growing business for them.

TEXTILES still take a lion's share of dye market, but better dyes are needed for the new synthetics.

NON-TEXTILE dyes and pigments color paper, paints, plastics, leather—a growing parade of products.

Digested from CHEMICAL WEEK, Sept. 22.

The synthetic dye industry has just marked its 100th anniversary. An accident gave the industry its start. In 1856, an Englishman, William Henry Perkin, noticed a dark mass forming during an experiment in which he was using aniline, a product of coal tar. When this dark mass was dissolved in alcohol, the result was a violet liquid, which would dye silk or wool.

What Perkin had done was to create the world's first synthetic dye—mauve. While the first application of mauve was dyeing fabrics, today a host of dyes and their pigment relatives color plastics, film, paints and coatings, paper, leather, inks. And the industry itself has grown from Perkin's small laboratory to an industry of worldwide significance.

I. The Public and Color

The most important of the influences that today shape the dye and pigment industry is the emergence of color as a powerful marketing tool. New uses of color are bringing a revolution in marketing. Product appeal already leans heavily on the use of color; research into why people buy emphasizes the tremendous importance of color.

Manufacturers have been quick to act on the consumer's desire for color. In Sweden, the U.S.A., Canada and several other countries, the housewife has her choice of kitchen appliances in a wide variety of colors. The American automotive industry for the past few years has been turning out cars with nearly every color of the rainbow, and in combinations of two or even three shades.

Color fashions change—fast. A shade can remain popular for just one season, or stay for several (as pink has done in the U. S. A.). Changing tastes present dye makers, and consumer goods manufacturers, with problems of over-supply in one color, shortage in another. So industry is experimenting with research techniques in an attempt to forecast consumer color preferences.

II. Textiles: Big Market

Even though the use of color is spreading into many product areas, textiles take the major part of the dye and pigment output. Roughly 80% of the world's dyes go into textiles.

Cotton, still the king of textiles, and viscose rayon, using the same type of dyes, take the majority of all dye output. Major emphasis in cotton and viscose dyeing is on high-speed continuous application of colors with a consequent decrease in unit costs. Here is how the industry fares in other textiles:

Acetate: Many of acetate rayon's dyeing troubles have been eliminated by spin dyeing (coloring the textile raw material prior to spinning it into a fiber.) Most of the fiber, however, is still dyed from water in a conventional manner. Several improvements have been made in dyes to upgrade wash-fastness for this fiber. But much room for research still exists.

Wool: The new premetallized dyes are cutting deeply into the conventional-dye market for wool. The reason is not difficult to find. Wool dyed with premetallized compounds has better light-fast, wash-fast properties.

Newer Synthetics: Most of the effort of the textile people is concentrated on better ways to dye newer synthetics and blends of natural fibers with the synthetics. Many of the problems have been solved, but new ones crop up with the introduction of each new fiber.

Polyamide (nylon, Perlon) dyeing has become fairly routine with a wide selection of acetate rayon colors and wool dyes to choose from. Polyester (Dacron, Terylene) dyeing is considered difficult at best. Some success has been obtained under pressurized conditions at 120°C.

The volume use of polyesters and acrylics (Orlon, Acrilan) is in blends with wool and cellulosics. In these materials the dry cleaning fastness of many dyes leaves much to be desired.

III. Pigments for Textiles

Textile dyes are meeting competition from pigments in the fabric printing field. Tailor-made resins have been developed, along with processes that bond the insoluble colored pigment to the cloth. And the problem of rubbing off has been solved with newer pigments.

Still another market for pigment manufacturers lies in the spin-dyeing field. Previously most manufacturers stayed away from it because of their fear of being caught with large inventories of unsaleable shades. To make spun-dyed man-made fibers, large yardages have to be run before the method can be considered economical. These runs can be made in only a limited number of shades for the stylists to choose from.

This lack of flexibility has until recently been considered an unsurmountable barrier. Nevertheless, a number of benefits operate on the side of the pigment spun-dyed goods. Acetate rayon manufacturers in particular have found

COVER: More and more pigments to meet the growing needs of textiles, paints, plastics, inks, pour out of the hoppers of plants such as this one operated by American Cyanamid Co. (Bound Brook, N. J., U.S.A.)

it a way to upgrade their material to meet the challenge of the better wash-fastness of the cellulosics.

Contrasted with acetate rayon and viscose, the newer synthetics are considerably more difficult to spin-dye. Better solvents and higher temperatures must be used. These methods allow only a limited selection of pigments which do not dissolve, agglomerate or decompose because of heat.

IV. Other Uses

Research is going forward fast in products other then textiles. Apparently it is in this direction that the dye industry feels its greatest new potential lies.

Currently, dye producers regard the paper industry as a most promising area in which to expand non-textile color sales. The reasons are obvious. Paper production is rising fast everywhere in the world. But so is production of paper's newer competitors. So paper makers are turning to color as a means of outflanking competition.

Dyeing paper board for point-of-sale shipping containers is a promising outlet for dyes. In other areas, paper firms are pushing colored (and printed) multiwall bags as advertising aids.

Basic dyes lead all the rest in paper coloring. Users find them inexpensive to apply, giving bright tints. Acid dye producers are being favored with some of the paper color business, too. Acid dye use, however, is more restricted than basic dye use because acids lack affinity for bleached cellulose. But acid dyes are finding outlets in surface-dyeing of paper board and heavyweight papers.

Pigment producers are pushing dyes to a small degree in coloring paper. Where paper or board is to be light-exposed for any length of time, pigments are used for light fastness.

In the race to find bright, light-fast colors for products exposed to sun and weather—exterior coatings for example—organic pigments are taking a decided lead over dyes. In automobile coatings, as in paints, bright pastel shades are most popular.

For coatings, light-fastness throughout is a specification color producers must meet. So for the pastel shades, paint and lacquer manufacturers are turning to more complicated chemical structures, such as vat dyes used as pigments. But high price is one drawback and light-fast bright yellows and reds have yet to be made by dye researchers.

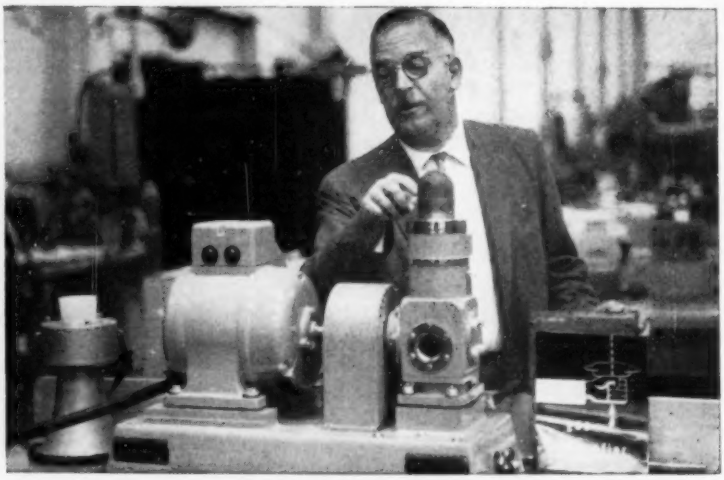
Producers of exterior house paints are also clamoring for pigments resistant to light. Here is one of the problems the pigment makers face: While a pigment may show excellent light-fastness in, say, an automotive alkyd-base coating, it may be entirely unsatisfactory in a masonry paint using an acrylic resin latex—and vice-versa.

The giant plastics industry will be consuming ever increasing tonnages of color. That is particularly true in view of the current trend to use colors in place of black and white in many finished plastic products.

Each plastic has its own particular requirements from pigments. In addition to ordinary requirements of light-and heat-stability, plastic manufacturers specify high pigment dispersability in their compositions. As present, over-all consumption of dyes and pigments by the plastics industry is small. On the other hand, growth potential is huge.

The dye-makers are also paying more attention to fluorescent dyes. These new dye products are gaining footholds in detergent, textile, and paper markets. In effect, they are used mostly for making off-shade whites whiter by "optical" bleaching, absorbing invisible ultraviolet light and emitting this as "white light."

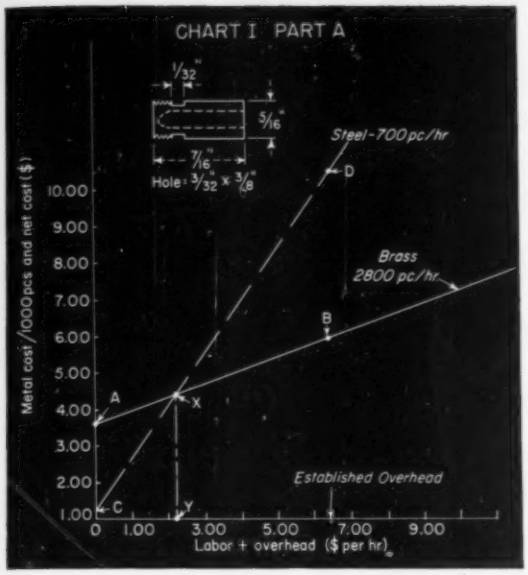
Dye-producers are also finding a good market among leather goods manufacturers, who find a growing style trend toward dyed shoes, jackets, luggage, women's accessories. ●

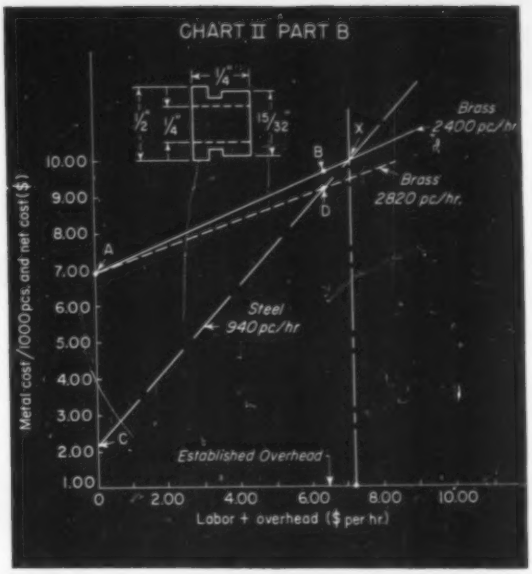


Dutch Heat Engine Liquefies Gases

Reverse a heat engine and you have a refrigeration machine—so the textbooks say. Instead of a hot gas turning the engine and producing power, you drive the engine with an outside source. The result is a cold gas exhaust. Add a few refinements and you can even liquefy the gas.

This is about what Philips Research Laboratories (Eindhoven, Netherlands) is doing with this small, compact—yet powerful—gas liquefier (above). The unit produces temperatures of −45°C. to −166°C. in a single stage. Its yield is 5 liters per hour of liquid air. The unit offers a convenient means of liquefying gases for laboratory use. It can be modified to produce liquid nitrogen, to recover escape gases and to dry gases. Liquefied gases from the apparatus can improve certain steels. Cold treatment can improve the durability of tool steels, increase the hardness of other steels and improve the properties of magnet steel. Also cold gases can freeze soft plastics to make machining easier. (*Chemical Week, Sept. 29, p 59*).





Metal Selection Saves You Money

Digested from AMERICAN MACHINIST, Oct 8, p138

Here's a situation that is relatively common in most metalworking plants: A part can be machined out of one of two metals. But how do you choose which metal? Too often the choice is simply made on the basis of the cost per kilogram of each metal.

This can waste money. Cost per kilogram alone does not decide the final cost per piece. What you have to consider is how many pieces can be produced in a unit of production time. Cost analysis of this problem requires a knowledge of labor-plus-overhead costs per machine, parts per hour from that machine, and the scrap value of the metal.

Two case studies of the same part made from brass and from steel show how to make a cost analysis. In the first, brass results in a lower cost; in the second, steel shows an advantage.

Table I assembles the data needed for analysis. "Part A" was made on one automatic screw machine using both steel and brass. "Part B" was made on a different machine, also using steel and brass. Overhead for both machines was $6.50.

Analyzing the figures for Part A, the cheapest net cost results from using brass, even though brass costs more. The reason is the much higher output per hour per machine—because of the fact that brass is easier to machine.

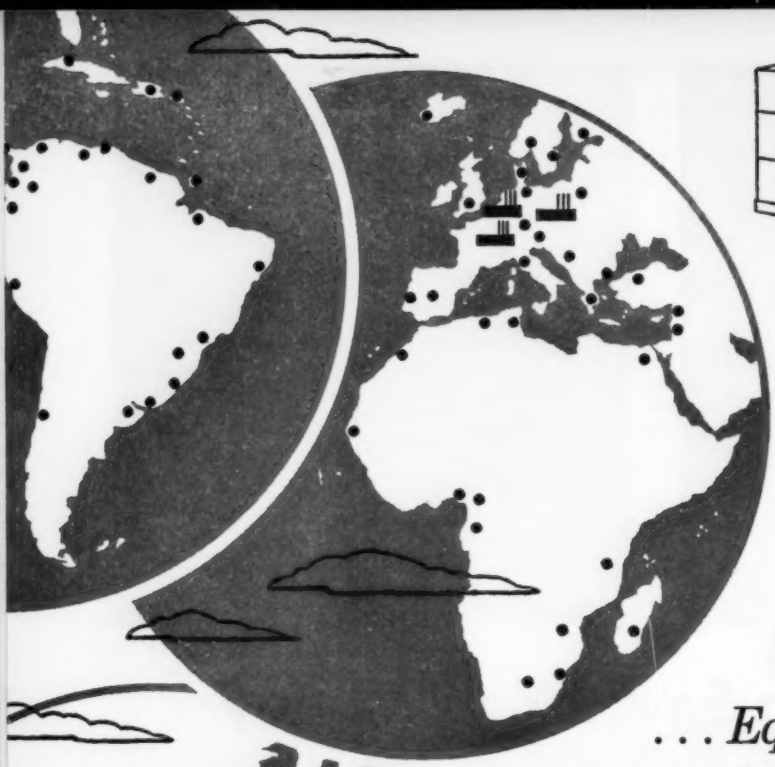
Looking at Part B, costs are close to being the same for the two materials. When the choice is this close in actual cost, you must weigh factors such as tool life and finish.

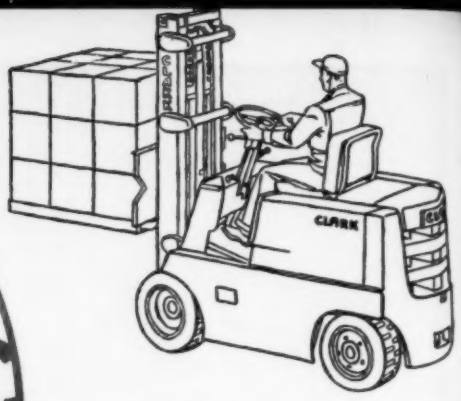
The figures in Table I also can be used in a different way—by constructing the charts shown above. They show how relationships in overhead and machining rates may be varied to affect net costs between two different metals.

Only three facts need be known to make the basic charts: (1) net cost per 1000 pieces; (2) metal cost per 1000 pieces, (3) labor-

Table I

		Part A		Part B	
		Brass	Steel	Brass	Steel
(1)	Gross wt/pc (lbs)	0.0114	0.0105	0.025	0.023
(2)	Cost/lb (dollars)	0.3844	0.1187	0.3642	0.1025
(3)	Material Cost/pc ((1) x (2))	0.00438	0.00125	0.00911	0.00235
(4)	Weight Scrap/pc (lbs)	0.0040	0.0037	0.012	0.011
(5)	Scrap Value/lb (dollars)	0.1800	0.0062	0.1800	0.0062
(6)	Scrap Credit/pc (dollars) (multiply (4) by (5))	0.00072	0.00002	0.00216	0.00007
(7)	Net Metal Cost/pc (dollars) (subtract (6) from (3))	0.00356	0.00123	0.00695	0.00228
(7a)	Net Cost per 1000	($3.66)	($1.23)	($6.95)	($2.28)
(8)	Labor & Overhead/hr (dollars)	6.50	6.50	6.50	6.50
(9)	Pieces Machined/hr	2800	700	2400	940
(10)	Labor & Overhead/pc (dollars) (8) divided by (9)	0.00232	0.00928	0.00271	0.00692
(11)	Net Cost/pc dollars) (add (7) and (10))	0.00598	0.01051	0.00966	0.00920
(12)	Net Cost per Thousand	$5.98	$10.51	$9.66	$9.20





You get local service with

CLARK EQUIPMENT

. . . Equipment available in several currencies

CLARK EQUIPMENT INTERNATIONAL distributors are located in 80 cities and in 56 countries, excluding Canada and the United States. There is probably a local CLARK distributor in your country able to assist you in solving your materials handling problems. To CLARK owners, he provides a reliable source of CLARK replacement parts and technical information assuring full use of the productivity built into every CLARK truck.

With production in Australia, Belgium, France, and Germany—as well as in the United States—world-famous CLARK fork lift trucks and replacement parts are now available in several currencies. These multiple sources of production assure faster delivery of equipment and ready availability of replacement parts with almost complete freedom from currency restrictions.

Listed on the adjacent page are the addresses of CLARK fork lift truck distributors—contact the one in your area for information concerning CLARK products for your own particular operation. If your country is not listed, it will be as soon as local distribution can be qualified. Meanwhile, write or cable directly to CLARK EQUIPMENT INTERNATIONAL for any information or assistance you require.

Throughout the World, Clark Equipment sets the standards of efficient materials handling

CLARK® EQUIPMENT

CLARK EQUIPMENT INTERNATIONAL, C. A.
BUCHANAN 4, MICHIGAN, U. S. A.
Cable Address: Interclark
Associated Manufacturers in Australia, Belgium, France, Germany and U. S. A.

Your local Clark Equipment Distributor is listed here:

EUROPE AND AFRICA

Algeria
Compagnie Centrale Industrielle et Commerciale
Algiers, Algeria
Austria
Columbia Commerce & Credit Corp., Ges.m.b.H.
Vienna 3, Austria
Belgian Congo
Manucongo, S.C.R.L.
Brussels, Belgium
Intair Company
Leopoldville, Belgian Congo
Belgium and Luxembourg
Coca, S. A.
Brussels, Belgium
British East Africa
Wigglesworth & Company (Africa) Ltd.
Tanganyika, British East Africa
Denmark
A/S Lars Arnbak & Co.
Copenhagen, Denmark
Egypt and The Sudan
The Delta Trading Company, S.A.E.
Cairo, Egypt
Finland
Ins.tsto H. Auramo
Helsinki, Finland
France
Les Ateliers de Strasbourg
Paris 2e, France
French Equatorial Africa and the French Cameroons
Societe d'Entreprises Africaines & Materiel Colonial Reunis
Douala, French Cameroons
Societe d'Entreprises & Africaines Materiel Colonial Reunis
Libreville, French Equatorial Africa
French West Africa
Cie. Francaise des Charbonnages de Dakar
Dakar, Senegal, French West Africa
Germany
Ruhr Intrans Hubstapler, GmbH
Mulheim/Ruhr, Germany
Great Britain
Aglo Ltd.
London E.C. 2, England
Greece
Technical & Commercial Company
Athens, Greece
Iceland
Elding Trading Company
Reykjavik, Iceland
Israel
Hamashbir Hamerkazi
Israel Cooperative Wholesale Society
Tel-Aviv, Israel
Italy
Bergomi, S.p.A.
Milan, Italy
Lebanon
John C. Salameh
Beirut, Lebanon
Madagascar
Madagascar Automobile
Tananarive, Madagascar
Morocco
Compagnie Centrale Industrielle et Commerciale
Casablanca, Morocco
The Netherlands
Koopman & Co.
Technische Handelmaatschappij N.V.
Amsterdam W, The Netherlands
Norway
Transportteknikk
Oslo 40, Norway
Portugal
Francisco Nobrega de Lima, S. A.
Lisbon, Portugal
Portuguese East Africa
G. Santos & Cia., Ltda.
Lourenco Marques, Portuguese East Africa
Rhodesia
J. Brockhouse (Rhodesia) Limited
Salisbury, Southern Rhodesia
Spain
Motocar, S. A.
Madrid, Spain
Sweden
A/B Bygg- och Transportekonomi
Stockholm, Sweden
Switzerland
Unitra, S. A.
Geneva, Switzerland
Tunisia
Compagnie Centrale Industrielle et Commerciale
Tunis, Tunisia
Turkey
Burla Biraderler ve Sai
Istanbul, Turkey
Burla Biraderler ve Sai
Ankara, Turkey
Union of South Africa
Premier Metal Company of South Africa Limited
Johannesburg, Union of South Africa
Yugoslavia
Dinara
Belgrade, Yugoslavia

LATIN AMERICA

Argentina
Eximia, S.r.L.
Buenos Aires, Argentina
Brazil
Octavio C. Guimaraes
Sao Paulo, Brazil
IMTEC, Importadora e Tecnica, S.A.
Rio de Janeiro, Brazil
Carvalho S/A
Recife, Brazil
Cia. Fabio Bastos
Porto Alegre, Brazil
British Guiana
Bookers Stores Limited
Agricultural Machinery Division
Georgetown, British Guiana
Chile
Soc. Importadora Tecnica—IMTEC, Ltda.
Santiago, Chile
Colombia
Grancoa, Ltda.
Bogota, Colombia
Grancoa, Ltda.
Barranquilla, Colombia
Grancoa, Ltda.
Cali, Colombia
Grancoa, Ltda.
Ibague, Colombia
Grancoa, Ltda.
Medellin, Colombia
Costa Rica
Compania Constructora Eric C. Murray, SA
San Jose, Costa Rica
Cuba
Armando J. Valdes & Cia.
Havana, Cuba
Dominican Republic
Dominican Motors Company
Ciudad Trujillo, Dominican Republic
El Salvador
Quinonez Hermanos, S. A.
San Salvador, El Salvador
Mexico
Maquinas y Equipos, S. A.
Mexico 7, D. F.
Cymaq del Norte
Construccion y Maquinaria del Norte, S. A.
Monterrey, N. L.
Western Materials Handling, Inc.
Lubbock, Texas
Robert H. Braun Company
Los Angeles 22, California
Netherlands Antilles
S. E. L. Maduro & Sons, Inc.
Curacao, Netherlands Antilles
Netherlands Guiana
Koopman & Co.
Handelmaatschappij H. J. DeVries
Paramaribo, Surinam, Netherlands Guiana
Nicaragua
Camiones y Maquinaria, S. A.
Managua, O. N.
Panama, Republic of
Guardia & Cia., S. A.
Panama City, Panama
Peru
Automotive Sales Corporation, S. A.
Lima, Peru
Puerto Rico
General Farm Equipment Company
San Juan, Puerto Rico
Trinidad
Trinidad Agencies
Port-of-Spain, Trinidad
Uruguay
Miller, Medeiros & Bastos, S.r.L.
Montevideo, Uruguay
Venezuela
Maquinarias Mendoza, C. A.
Caracas, Venezuela

PACIFIC AND ASIA

Australia
Tutt-Bryant Limited
Sydney, New South Wales, Australia
China (Formosa)
William Hunt & Company (Int.) Inc.
Taipei, Taiwan, Formosa
French Indo-China
Denis Freres
Saigon, French Indo-China
Guam
Atkins Kroll (Guam) Limited
Guam, Marianna Islands
Hong Kong
William Hunt & Company (Int.) Inc.
Hong Kong
India
Carter Pooler & Company
Calcutta, India
Jost's Engineering Co., Ltd.
Bombay No. 1, India
Indonesia
Import en Export Kantoor
Koopman & Co., N. V.
Djakarta, Java, Indonesia
Japan
Mitsubishi Shoji Kaisha, Limited
Chiyoda-Ku, Tokyo, Japan
M. I. Greisman and Son (Far East)
Chiyoda-Ku, Tokyo, Japan
New Caledonia
Agence Alma
Noumea, New Caledonia
New Zealand
R. R. Fisher & Co., Ltd.
Auckland C.1, New Zealand
Philippines
United Services Corporation
Manila, Philippines
Singapore
United Engineers Limited
Singapore
Thailand
The Thep Vivat Company, Limited
Bangkok, Thailand

CLARK EQUIPMENT INTERNATIONAL, C.A.

CLARK® EQUIPMENT

BUCHANAN 4, MICHIGAN, U. S. A. Cable: Interclark

Associated Manufacturers in Australia, Belgium, France, Germany and U.S.A.

plus-overhead per machine. Here's how Chart I for Part A is constructed: Point A is $3.66 (line 7a, brass) and Point B is the intersection of overhead cost at $6.50 (line 8) and net cost of $5.98 (line 12). Connect points A and B to provide the line showing brass relationships.

Now construct a line for steel in the same manner. Also, draw line X-Y, vertically, from the intersection of the brass and steel lines down to the horizontal base.

What do these lines mean? First, any time line X-Y is to the left of the overhead line ($6.50), the metal being compared (steel) will be more costly than the metal used as the basis of comparison (brass). The only way steel can compete with the cost of brass is either to increase the machining rate or to decrease the labor-plus-overhead cost to $2.20 per hour. (Line X-Y meets the horizontal scale at $2.20.) Actually, neither is usually practical.

Constructing Chart II for Part B by the same method will show a different situation. Here, line X-Y is to the right of the overhead cost, therefore steel is less expensive than brass.

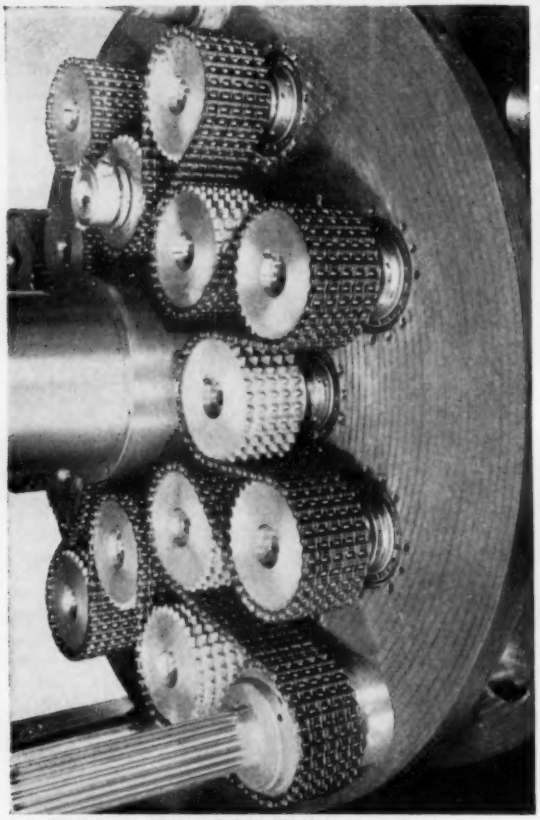
What else can these charts show? For one thing, Chart II shows that $7.20 is the correct overhead to turn out brass or steel parts at the same cost. By inference, the chart also says that the brass is not being machined at an efficient rate.

A simple calculation will show the higher rate possible. Thus, 2400 pieces of brass and 940 pieces of steel are machined per hour, which is a ratio of about 2.5 to 1. Arbitrarily take a ratio of 3 to 1, or 2820 pieces per hour. This increase will change the value of line 10, or 650 divided by 2820, equalling 0.00231. This gives a new net of $9.126 per thousand or a saving of 43.4 cents.

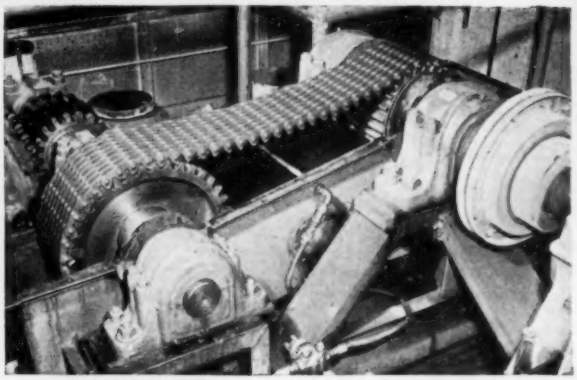
All of these data imply other things too: how to increase the return on machines if they are making parts from materials which do not allow the full capacity of the machine.

The data also indicate whether the machines being used are actually competitive. Some machines are so slow that the machinability of a metal cannot be utilized. ●

LINK-BELT RESEARCH AND ENGINEERING...WORKING FOR INDUSTRY



PRECISION STEEL ROLLER CHAIN, on serpentine machine tool drive, incorporates such Link-Belt long-life "extras" as shot-peened rollers and lock-type bushings.



SILENT CHAIN DRIVE comfortably handles extreme peak loads of draw bench service. This better-than-98%-efficient chain is available in sizes from 3/16-inch pitch to 2-inch pitch.

CLASS C COMBINATION CHAIN — with pusher attachment every 12th link—forms a dependable conveying medium for pulpwood logs at this modern paper mill.

Because Link-Belt makes industry's most complete chain line, the best one can be recommended for your job . . . assuring

extra life in drives and conveyors

Since every drive and conveying application has its own particular combination of wear, speed and load conditions, correct chain selection is all-important to maximum life. And there's no better way for industry to meet its specific needs than by selection from Link-Belt's broad line of power transmission and conveying chains — silent and roller chain; cast, combination, forged and fabricated chain.

For applications destructive to certain metals, Link-Belt offers the alternatives of steel, malleable iron and longer-wearing Promal. There's still further specialization offered by a wide range of attachments that adapt these chains to variations of specific service. And where needs are unique, Link-Belt can call on unmatched experience to guide development of new designs.

Whether you manufacture equipment incorporating chain or need only a single replacement strand, let Link-Belt aid your selection. Call your Link-Belt representative. Or write LINK-BELT COMPANY, DEPT. 1256-MD, 2680 Woolworth Bldg., New York 7, N. Y.

14,289-E

LINK-BELT

One source . . . one responsibility

for materials handling · power transmission · processing machinery

IN ISRAEL, A. Bromberg & Co. (Tel Aviv), renews agricultural and construction equipment by hardfacing techniques. The welder in the picture is coating a tractor sprocket with semi-austenitic electrodes, giving them a service life comparable to that of a new part. Initial problem was overcoming customer resistance. Free trials by Bromberg convinced customers of the technique's value.

IN VENEZUELA, oil pipeline is joined by inert-gas-shielded arc welding. Country's plans include use of welding in building power plants, railroads, highways, communications systems. Today oil companies form largest users of welding techniques.

ELSEWHERE in the world . . .

Welding Shows New Tricks

Digested from WELDING ENGINEER, Oct

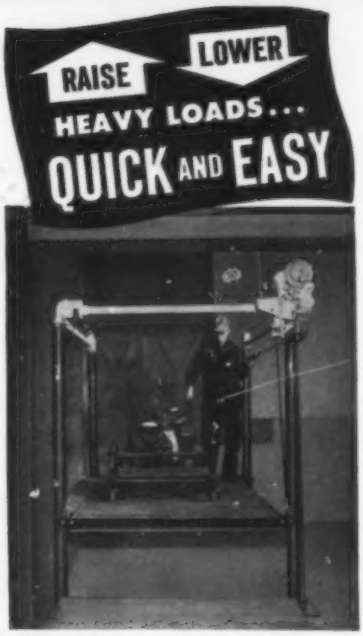
INDIA'S Chittaranjan Locomotive Works (about 240 kilometers from Calcutta) makes 200 locomotives each year. Much of the credit for this production goes to modern welding and flame-cutting techniques, according to the plant's manager.

Here's one example: Chittaranjan management decided it would have to make locomotive frames rather than import them. Its solution is to weld and flame-cut bar stock to the proper shape. Three pieces, 3.3 meters long, 0.8 meters wide and 12.7 centimeters thick, are butt welded to make one long bar. Automatic submerged-arc welding equipment joins the pieces. Finished joints have 26 passes of the arc on each side. When the three short bars are completely welded, an oxy-acetylene flame-cutting machine with a tracer head gives them their required shape. Welded frames proved durable.

GERMANY has built the world's largest flash-butt welding machine. Built by Siemens-Schuckertwerke, GmbH, (Nurnberg), it is capable of welding cross sections up to 400 square centimeters. The welder operates automatically and is 7.8 meters long, 3 meters wide and 6 meters high. It has an upsetting force of 120 tons.

Fitted with two clamping jaws, the flash-butt machine has a clamping pressure of 180 tons on each jaw, and a short-circuit welding current of about 100,000 amperes. Water compressed at a pressure of 249 kilograms per square centimeter provides clamping and upsetting forces.

The two work pieces to be welded are held by the clamping jaws. The left jaw is connected to the welder bed, and the right



WITH

GLOBE Electro-LOADERS

Ramps, stairs, make-shift inclines are eliminated; trucks, trailers, rail cars are conveniently and safely loaded . . . preventing damage and breakage caused by manual lifting . . . when a Globe "Electro-Loader" is used.

Installed at low cost in a few hours . . . indoors or outside . . . in loading areas, storage sheds, beside machines and conveyors . . . on any concrete, wood, or paved surface. Power is supplied by electric motor operating simple cable mechanism.

For permanent, temporary, or portable use. No excavation or special foundation needed . . . only four base plates to anchor. Relocation is fast and easy. Or mounted on casters for complete mobility if desired.

Use the coupon to get all the facts on this modern, easy-to-operate lift.

IMMEDIATE SHIPMENT

Carried in stock, Globe "Electro-Loaders" are ready for prompt shipment.

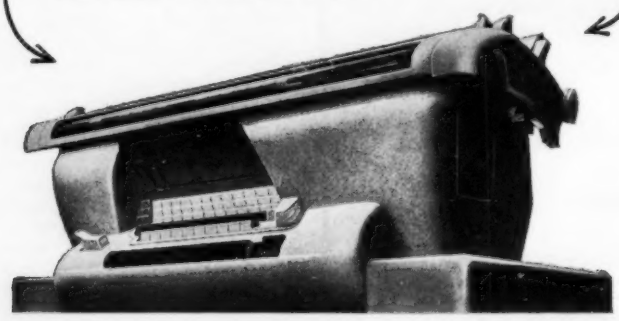
GLOBE TODAY!
Electro-LOADER
PLANTS: DES MOINES – PHILADELPHIA
LONG BEACH, CAL

Globe Hoist Co., Export Dept.
1000 E. Mermaid Lane MMD-710-EL
Philadelphia 18, Penna., U.S.A.
Cable Address "GLOBEHOIST"
Please send me illustrated data booklet on Globe "Electro-Loaders."
Name
Address
City Country

How **YOUR** *accounting department can benefit by* **OUR** *experience*

How would you like to cut accounting costs 40% to 60%—accounting time up to 70%? And how would you like to get daily figures on sales, costs and overhead—neatly prepared, fully itemized and mechanically accurate—as an automatic by-product of normal posting? Whether you number your accounts in the hundreds or in the thousands, these are some of the benefits you can expect from a Remington Rand system of mechanized accounting.

Remington Rand is uniquely qualified to set up such a system. In studying your procedures, analyzing your problems, and recommending a program of mechanization, your Remington Rand representative draws upon the world's richest storehouse of business experience. Experience gleaned from thousands upon thousands of case histories. Experience accumulated over a span of 81 years.



Remington *Foremost* Accounting Machine

You benefit by Remington Rand experience in another way, too. The Remington Foremost Accounting Machine—which is the heart of your new mechanized accounting system—is the most advanced business tool of its kind ever made. This single machine does all these jobs: payables, receivables, payroll, general ledger, cost distribution, sales analysis and inventory. What's more, it switches from one job to another in seconds. Its keyboard is completely electrified, and can be mastered by any competent typist in just half an hour.

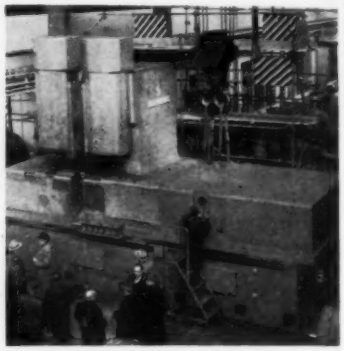
Give your business the benefit of mechanized accounting — send for the man from Remington Rand today!

Remington Rand International
DIVISION OF SPERRY RAND CORPORATION

There are 18,000 Remington Rand Branches and Distributors throughout the world — see your telephone directory for your local representative.

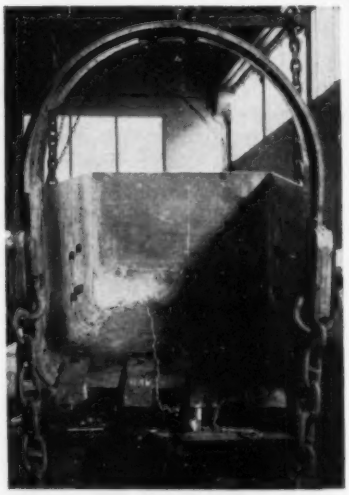
jaw to a table that moves horizontally. Each jaw is connected to the welding transformer. A push-button initiates the cycle.

At first, ends of the pieces to be welded are brought together until



GERMAN flash-butt welding machine, the world's largest, joins train rails.

a short-circuit is formed. Then, they are drawn apart until arcing flashes (blows) the joint area thus cleaning it. Immediately after flashing, the ends are pressed together with an upsetting force of a maximum of 120 tons while the welding current is shut off. Tests show that welds made by this machine have equal or higher strength than the parent metal.



DUTCH gas weld aluminum plate to make lightweight, efficient bucket.

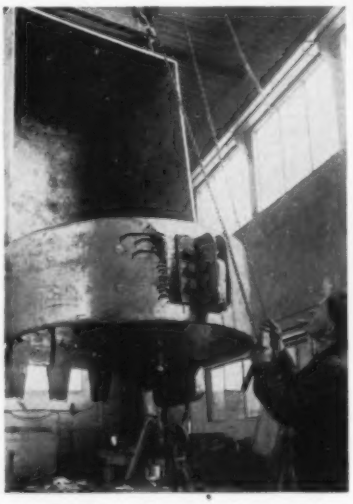
IN THE NETHERLANDS, a small welding shop recently gas-welded an aluminum alloy bucket for a dragline earthmoving ma-

chine. The bucket has proved highly successful in loose soil. It has a capacity of 208 kilograms and was made of an aluminum-magnesium alloy.

One reason for the aluminum bucket is the material's light weight. A light bucket saves power, yet can bite into loose soil. Heavier buckets, of course, would be needed for dense soil.

The bucket's bottom and back end were bent so that both longitudinal welds could be made outside the corners. This way, welding proved easier and distortion was minimized.

A double-V groove in each piece at the joints was necessary because of the thickness of the material. Two oxyacetylene torches, one on each side of the joint, provided the necessary heat. Prior to welding, the joints were preheated. Two passes of the torches completed the joint. When welding



WELDED aluminum bucket used less power, showed better wear properties.

was finished, the grooves were again heated and seams were hammered.

IN FRANCE, Enterprises Metropolitaines & Coloniales (Rouen) has systematically studied resistance welding of structural steel. The studies point to considerable savings in material and weight through resistance spot welding. Because rivet holes tend to weaken a structure—and require extra beam strengthening material—spot welding permitted immediate savings. No rivet holes are required. Material and weight contained in rivet heads, plus the time taken to drill rivet holes, were also eliminated.

A three-phase resistance welding machine is used by the company. It is rated at 450 kilovolt-amperes and its capacity is a maximum of three thicknesses of 1.78 centimeters each. Maximum current is 75,000 amperes. Electrode force is 14 tons.

A typical beam fabricated by Enterprises Métropolitaines was almost 21 meters long. It was part of a 39-meter-long assembly weighing 45 tons. A total of 182 spot welds in two rows was used to fabricate the entire structure. Thicknesses welded were 1.4 centimeters and 3.2 centimeters. The welder was suspended from an overhead traveling crane and was moved along the sections to be joined by spot welding. The entire beam was fabricated in less than two hours. ●

The VULTURE combined scrubbing and polishing machine in action scrubbing the surrounds of the Public Baths at Bremen

DESIGNED AND MANUFACTURED BY

Cimex-Fraser Tuson Ltd.

CRAY AVENUE · ORPINGTON · KENT.

"Will roads be better when I grow up?"

A.R.B.A.
ROAD SHOW
Jan. 28 - Feb. 2
1957
Chicago

They can be. The present expanded program is planned to keep highway capacity in step with the world's economy until 1975 — provided each highway dollar is spent as effectively as possible.

Next January, the most important convention and exhibition ever held by the road building industry will take place. All the technical advances in methods, equipment and materials that will make it possible to build the new roads better, faster and cheaper will be on display. If you're part of this industry, you can't afford to miss it. Even if you're not personally involved with highway construction, you'll want your city, town or county represented.

Remember, more highways mean more construction of all kinds.

For the sake of a safer, stronger world . . . . attendance by everyone concerned is a must!

This message contributed in the interests of better highways for future progress by the McGraw-Hill Construction Publications — ENGINEERING NEWS-RECORD
CONSTRUCTION METHODS AND EQUIPMENT • CONSTRUCTION DAILY • INGENIERIA INTERNACIONAL CONSTRUCCION • 330 West 42nd Street, New York 36, New York

Fuel Injection for 1957 Cars

What was once strictly for the sports car enthusiast will soon be available to the general public on production cars in the U.S.A.

Digested from THE AMERICAN AUTOMOBILE, Nov, pp 32, 42, 45

When the Chevrolet Division of General Motors Corp. announced it was making the first U. S. production automobile with fuel injection it set in motion what may well be the most talked about development of the new model year.

For one thing, fuel injection is the first really radical change in the method of feeding fuel to an engine. Up to now, the carburetor has handled this chore—virtually unchanged since its inception. Furthermore, fuel injection permits a substantial boost in power output. Chevrolet gets one horsepower per cubic inch of piston displacement (283 horsepower)—the first U. S. car to do so. Incidentally the advent of fuel injection bolsters the view that the U. S. auto makers are not yet ready to abandon the race toward higher horsepower.

Chevrolet's system, developed by Rochester Carburetor Div., GM., injects a continuous stream of fuel into each cylinder intake port. The volume of air flowing past the throttle controls the quantity of fuel dumped into each port. The driver, in turn, controls the volume of air by means of the accelerator pedal. A high-pressure pump delivers fuel to a metering chamber with two outlets. One outlet acts as an overflow; the other outlet leads to a spray nozzle in each intake port.

Chevrolet and Rochester Carburetor are by no means alone in the adoption and development of a fuel injection system. Germany's Robert Bosch GmbH has done a great deal of work in gasoline fuel injection systems. In Europe, Mercedes, BMW, and Goliath automobiles all use the Bosch fuel system. And it is considered likely that Studebaker-Packard in the U. S. A. will adopt the Bosch system if S-P's new business tie with Daimler-Benz develops.

Other entries into the fuel-injection field include Borg-Warner, Bendix Aviation, American Bosch Arma, and Thompson Products, all American companies. The AC Spark Plug Co. is reported working on an electronic fuel injection system. And the U. S. A.'s Holley Carburetor Co. has joined with England's Joseph Lucas to exchange information.

Bendix Aviation has reached the stage where it is ready to talk about its system. Its engineers say they have "more customers than we ever dreamed we would have."

Instead of measuring fuel, the Bendix system measures time electronically to 0.001 second. Very simply, this is the way the system works: Fuel is always present at each injector at 1.4 kilograms per square centimeter. Each injector opens electronically in the cylinder firing sequence, and is held open for the duration of the time required to meet the needs of the engine at that time. As the injector opens, it squirts fuel into the intake port.

Heart of the system is an electronic modulator using transistors. It integrates all the variables of engine operation and sends a precise signal to the injectors, telling them when to open. These are the variables acted on by the modulator: manifold pressure, accelerator enrichment and idle, water or exhaust temperature to interpret choke requirements, amount of unburned fuel in the exhaust, and altitude to assure proper air-fuel mixture. Most of the components in the system have proven themselves in the aviation industry.

Chevrolet was the first to announce fuel injection as an optional feature. Ford will probably have an optional fuel injection system for its Thunderbird sports car. Chrysler Corp. has said nothing officially, but it is known to be experimenting and it has studied the Bendix system. So a switch from standard carburetion to fuel injection, at least on an optional basis, is certain to occur early next year. ●

BIG, RUGGED, FAST

TRACTOMOTIVE TL-12 TRACTO-LOADER is a high-production machine on all kinds of excavating-loading and tough material handling work. It combines strong construction for long life, 4-WHEEL DRIVE for excellent traction and POWER STEERING for easy handling. Has 2.43m (8-ft) dumping clearance and there is extra long reach because front tires do not extend ahead of machine.

In addition, the TL-12 has the same outstanding advantages common to all other models of TRACTO-LOADERS.

A HYDRAULIC TORQUE CONVERTER DRIVE makes loading smooth and fast, without engine stalling.

A CLUTCH-TYPE TRANSMISSION practically eliminates gear shifting. The operator just pulls or pushes a lever to go forward or reverse.

A 0.86m³ (1⅛-cu yd) TIP-BACK BUCKET scoops up heaping loads and carries them low, in a level position. This keeps load in bucket, gives operator full visibility.

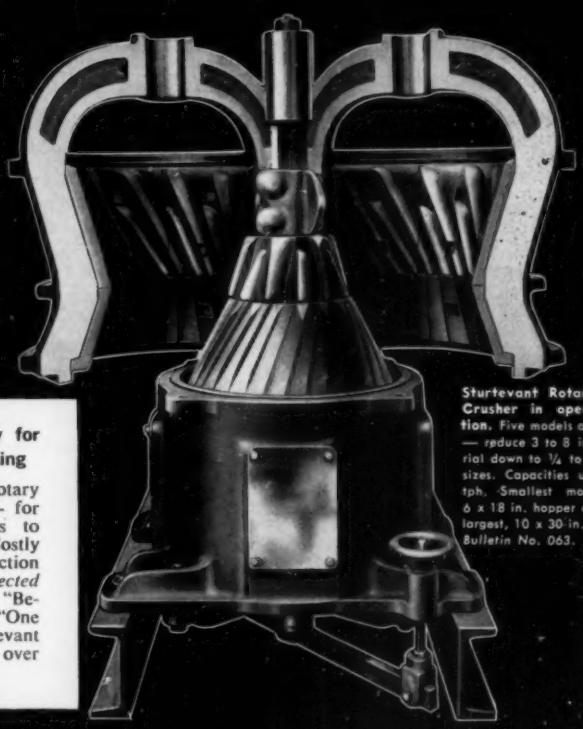
Ask your ALLIS-CHALMERS CONSTRUCTION MACHINERY DEALER to show you the TL-12 or the three smaller Tracto-Loaders in action. Send for free catalog.

TRACTOMOTIVE
TRACTOMOTIVE CORPORATION
Export Dept. MD, Deerfield, Ill., U.S.A.

PRODUCTION ALWAYS ON SCHEDULE

Thanks to

"OPEN-DOOR" DESIGN



Sturtevant Rotary Fine Crusher in open position. Five models available — reduce 3 to 8 in. material down to ¼ to 1¼ in. sizes. Capacities up to 30 tph. Smallest model has 6 x 18 in. hopper opening; largest, 10 x 30 in. *Request Bulletin No. 063.*

"One Man, One Minute" Accessibility for Inspection, Clean-outs, Trouble-shooting

One man can swing open a Sturtevant Rotary Fine Crusher in a matter of minutes — for inspection and maintenance — thanks to Sturtevant's unique "Open-Door" design. Costly downtime is cut to a minimum, production kept on schedule — *even when the unexpected happens.* Little wonder that users say: "Because of their rugged construction and "One Man, One Minute" accessibility, Sturtevant machines give us *lower* operating costs over *more* years."

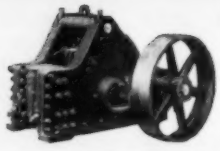
STURTEVANT ROTARY FINE CRUSHERS REDUCE SOFT TO SEMI-HARD MATERIALS FASTER, MORE ECONOMICALLY

For uniform crushing of soft (clay, charcoal) to moderately hard materials (softer limestone, cement clinkers), the Sturtevant Rotary Fine Crusher is practically non-clogging — much faster than other machines, less costly to operate.

Smooth production flow. The single turning of a hand wheel regulates the output size (from ¼ to 1¼ in. on largest model) — provides a uniform product, dustless operation, steady output for greatest production efficiency.

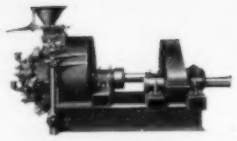
A lifetime of low-downtime service. Built into Sturtevant Rotary Fine Crushers is Sturtevant's 83 years of successful engineering of dry processing units and equipment. Rugged construction, plus easy accessibility provided by Sturtevant's unique "Open-Door" design, assures more output per machine year.

Write today, Address: Sturtevant Mill Company, 141 Clayton St., Boston 22, Mass.



JAW CRUSHERS

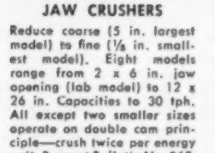
Reduce coarse (5 in. largest model) to fine (⅛ in. smallest model). Eight models range from 2 x 6 in. jaw opening (lab model) to 12 x 26 in. Capacities to 30 tph. All except two smaller sizes operate on double cam principle—crush twice per energy unit. *Request Bulletin No. 062.*



RING ROLL MILLS

Reduce hard or soft 1½ in. and smaller material to from 6 to 200 mesh. Grind only — no screens. Capacities of 3 models range up to 18 tph, depending on model and material. Ring diameters and faces 24 x 7 in.; 45 x 8 in.; 44 x 14 in. *Request Bulletin No. 079.*

ALL STURTEVANT MACHINES ARE DESIGNED TO OPERATE ADVANTAGEOUSLY IN "UNITS"



HAMMER MILLS

Reduce to 20 mesh. Swing-Sledge Mills crush moderately hard material up to 70 tph. Hinged-Hammer Pulverizers crush softer material at rates up to 30 tph. Four Swing-Sledge Mills with feed openings from 6 x 5 in. to 20 x 30½ in. Four Hinged-Hammer Pulverizers from 12 x 12 in. to 12½ x 24 in. *Request Bulletin No. 084.*

CRUSHING ROLLS

Reduce soft to hard 2 in. and smaller materials to from 12 to 20 mesh with minimum fines. Eight sizes, with rolls from 8 x 5 in. to 38 x 20 in.; rates to 87 tph. Three types — Balanced Rolls for automatic adjustment in operation; Plain Balanced Rolls; Laboratory Rolls. Recomended for 3 to 1 reduction. *Request Bulletin No. 065.*

STURTEVANT

Dry Processing Equipment

The "OPEN-DOOR" to *lower* operating costs over *more* years

CRUSHERS • GRINDERS • MICRON-GRINDERS • SEPARATORS
BLENDERS • GRANULATORS • CONVEYORS • ELEVATORS

Looking Ahead in Technology

UNIQUE air-conditioning system raises air temperature in the winter by making ice and uses the ice to reduce the temperature in the summer. It is in operation at the Stobie section of International Nickel Co.'s Frood-Stobie mine in the Sudbury district of Ontario, Canada.

A 5-meter-diameter fan blows fresh air from the surface into two huge stopes (underground holes) arranged like a double-pass heat exchanger. Each stope is 24 meters wide, 60 meters long, and 60 meters high. The air circulates through the two stopes in succession on its way to the mine intake.

Up to 0.8 cubic meters of water is sprayed from four spray points at the top of each stope. The fine water droplets turn to ice, and the heat in the water is given up to the air. About 40,000 tons of ice can be formed at the bottom of the stopes during the winter. Over such a period the heat from the ice combined with that absorbed by the air from the large area of wall rock totals 15,000-million Btu.—equivalent of 850 tons of coal. (*Chemical Engineering, Oct, p114*)

●

TECHNOLOGY BRIEFS: The German post office plans to introduce automatic mail distribution. About 70% of all letters originate with commercial establishments, and a four-number code has been assigned to each, based on telephone numbers. A pilot electronic sorting system is already in use.

An "atomic glass" that will radiate light when struck by radioactive rays is under development in Britain. The glass, which is fully transparent like ordinary glass, has a number of potential uses—in industrial radiation monitors and gages, and advertising displays. The glass apparently operates under a different principle than does the phosphor-coated glass now being studied by Westinghouse Electric Corp. This phenomenon is called electroluminescence. (*McGraw-Hill World News*)

Three American lathe builders are reported interested in producing a new screw-cutting lathe developed by a Brazilian firm—Industria de Maquinas Agricolas-Romi SA, Sao Paulo. The new lathe has a gear box with automatic controls allowing the manufacture of 384 different screws without changing gears. (*American Machinist, Oct 8, p101*)

●

ADHESIVES in coils is a new concept in the handling and application of adhesives. Called Thermogrip and developed by the B.B. Chemical Co., Div. of United Shoe Machinery Corp., it is a dry and completely solid thermoplastic adhesive that is fed in the form of a string into an applicator that melts, feeds, and applies it. No mixing, weighing, and handling of liquids are required; the adhesive is ready to use as received. Thermogrip applicators will fit existing machines as well as new machines. Adhesives will bond wet-strength Kraft, coated paper and board, aluminum foil, fabrics, etc. (*Product Engineering, Oct, p5*)

●

TEXTILE PROGRESS: Tropical-wear cottons will be pushed by England in world markets. One fabric, known as Helikon, has the appearance of linen and is said to be wrinkle-proof in the hottest weather. The material can be washed without ironing.

Dacron (du Pont's polyester fiber) fire hose will make the fireman's work easier. Made in 30-meter lengths, the hose is much lighter than conventional hose, absorbs 25% less water, and dries quickly. Abrasion tests show great resistance to wear from dragging. Manufacturer is Quaker Rubber Div., H. K. Porter Co., Inc., U.S.A.)

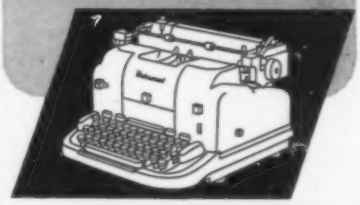
Long-staple cotton will become scarcer in world markets as Egypt ships increasing amounts to Communist countries. On this assumption, the Supima Association of America is asking for increased acreage allotments for next year. About 50,000 bales are expected to be harvested this year. (*Textile World, Oct, p4*)

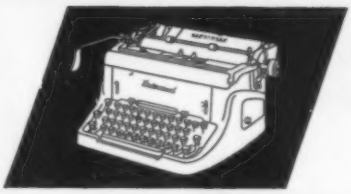
All over the world

UNDERWOOD

means

THE FINEST IN TYPEWRITER PERFORMANCE





See the

UNDERWOOD ELECTRIC, STANDARD & PORTABLE TYPEWRITERS

•

SALES AND SERVICE THROUGHOUT THE WORLD

•

CONSULT YOUR LOCAL UNDERWOOD DEALER, OR WRITE TO US:

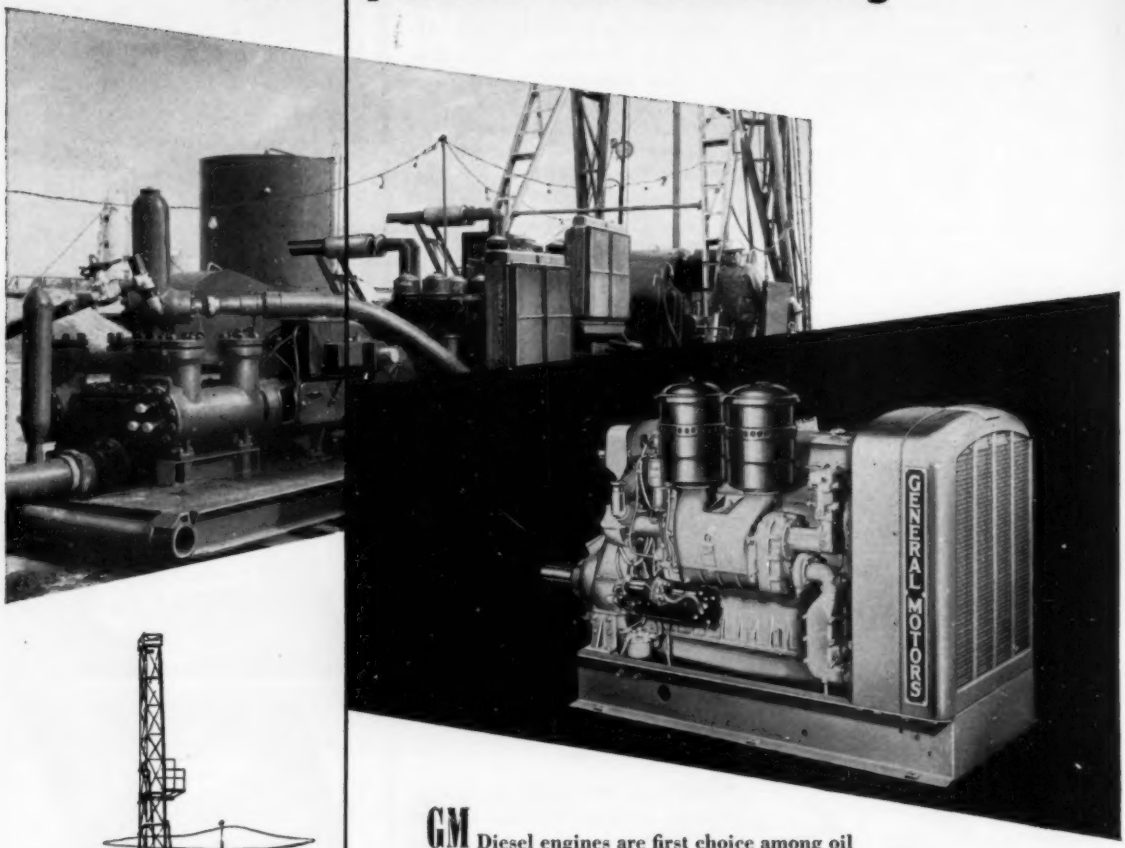
UNDERWOOD CORPORATION

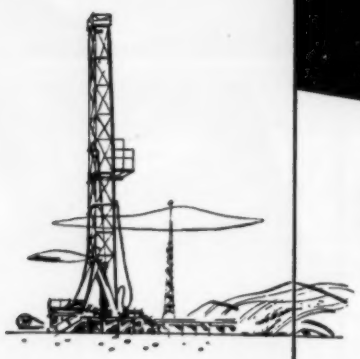
International Division

1 Park Ave., New York 16, N. Y., U. S. A.

TYPEWRITERS • ADDING MACHINES
ACCOUNTING MACHINES

The power of economy





GM Diesel engines are first choice among oil drillers everywhere! They are easily loaded on trucks . . . fit within road widths . . . require less time for set-up or tear-down. Operating on the 2-cycle principle—power at every piston downstroke—GM Diesels pack *more* power in *less* space. Most remarkable of all, though, is their *economy!*

Economy in Operation. GM Diesels cost less as a result of General Motors' efficient mass-production methods. Through 2-cycle design, reversal of inertia forces in reciprocating masses is eliminated—pressure is exerted downward on pistons during all strokes. This, together with moderate piston speeds, results in extended bearing and cylinder liner life.

Economy in Maintenance. GM Diesels reduce downtime to a minimum. Maximum interchangeability of low-cost parts, in engines of same series, reduces parts stocks and keeps maintenance costs to a minimum.

Economy in Durability. Rugged GM Diesels run for thousands of hours between overhauls. When parts and service are required, they're quickly available through a world-wide distributor-dealer organization, backing up GM Diesel performance with competent service and low-cost parts.

General Motors Overseas Operations
DIVISION OF GENERAL MOTORS CORPORATION

1775 BROADWAY, NEW YORK 19, N. Y., U. S. A.

ARGENTINA, Buenos Aires
AUSTRALIA, Melbourne
BELGIUM, Antwerp
BRAZIL, São Paulo
DENMARK, Copenhagen N.
EGYPT, Alexandria
ENGLAND, London, S.W. 1
FRANCE, Paris
GERMANY, Russelsheim/Main
MEXICO, Mexico, D.F.
NEW ZEALAND, Wellington
PAKISTAN, Karachi
PERU, Lima
PORTUGAL, Lisbon
SOUTH AFRICA, Port Elizabeth
SPAIN, Barcelona
SWEDEN, Stockholm 20
SWITZERLAND, Bienne
URUGUAY, Montevideo
VENEZUELA, Caracas

GM GENERAL MOTORS DIESEL POWER

FOR ADDITIONAL DETAILS, CONTACT THE GMOO REPRESENTATIVE NEAREST YOU.

GENERAL MOTORS LOCOMOTIVES

Package Design Is Your Problem

COMPANY PERSONALITY is reflected by package design—all phases of your company are involved.

POLICY DECISIONS are made by management, not by designers. A company's marketing success is at stake.

Digested from HARVARD BUSINESS REVIEW, Sept.-Oct. p. 46

Packaging is a powerful force in today's mass market. Management must move on the widest possible front to take advantage of its potentialities. And management direction of packaging has to be established—no matter how limited a company's package program may be.

The phrase "packaging design" includes all that goes under the name of styling—the appearance of an automobile as well as of a can of food or box of paper clips. And packaging policy influences all operations of a company—from the purchasing and production departments to the sales manager and to the directors.

Without strong leadership from top management, serious breakdowns in a packaging program can develop. In one instance designers worked for several months developing a new trademark, only to discover that what management really wanted was a new logotype (company signature), not a brand symbol at all. Basic policies must be hammered out before the detailed design work starts.

To set sound policies and actively direct a packaging program, you must clarify your own thinking in the whole area of visual communications. The first requirement is a basic understanding of the fundamental principles of packaging and design. Then you must work out for yourself the function that visual communication is going to have in your company.

Packaging involves product style, advertising, trademarks, letterheads, displays, product names, and distribution systems. The design reflects the tone of your firm: setting this tone has always been a duty of management.

I. Design—or Redesign?

Most package design projects fall into one of four categories: (1) improvement of an old package, (2) redesign of an old package, (3) design of a package for a new product, and (4) design of a package for a product that has never been packaged before.

Should you start fresh and redesign your product packages? Or should you just improve the old design? A designer can help to evaluate the format and actual impact, but the choice is clearly for management to make.

Some packages, especially if produced by hit-or-miss methods, are so poor that they actually may be hurting sales. Take the case of a company manufacturing kitchenware. In setting up a product improvement program, the company launched a planned program of package design. At the time, the current style was a conglomeration of old ones. The company called in design consultants.

An analysis showed that the old design was poor from the esthetic standpoint and lacked style. Its elements were haphazardly arranged; no strong visual motif was stressed. These faults combined to tell the customer that the product was not a quality item. Furthermore, though most of the customers were women, the package had no feminine appeal.

In the new design that was developed, color, styling, and lettering created a visual personality aimed at the feminine market. A distinctive logotype—or signature—established an individual eye-compelling brand identity. This logotype was so successful that the company began using it instead of its corporate name on name plates, letterheads, all visual media.

In this case, management's willingness to break with old traditions and prejudices was the key.

II. Subtle Improvement

If a brand is too well established to risk drastic changes, you might want to alter the package without appearing to.

A typical example was the processed-foods firm that had an already famous label. This firm hoped to increase its label identification by improving the readability of the design.

With millions at stake, management entered into test trials with designs that eliminated one or more parts of the design. These tests isolated three key factors: the color of the label, the logotype, and a metallic insignia historically associated with the company. Here's what the designers did:

The existing color combinations were made more compelling by deepening the intensity of one of the colors and changing the ratio of space. With imperceptible changes, a stronger label with a feeling of lightness was created.

Lettering changes in the logotype were obvious: The signature had a cluttered look and the upper case letters were not perfectly legible. Because the stamp was so well known, the upper-case letters were left slightly illegible. Instead, the designers decided to simplify the lower case letters and leave more space between the letters.

Because the insignia seemed out-of-date as a visual device and served no useful function, the designers were strongly tempted to eliminate it. But second thoughts recognized the sales function of the insignia in terms of consumer recognition. So the insignia was retained, simplified in design and reduced in size.

When the new package appeared on the market, it is unlikely that consumers noticed the change.

The company's goal was subtle improvement, not striking change.

III. Analyze New Products

If you develop a new packageable product, you must decide whether to design a new package or use an old one. The rigorous analysis required to reach a decision often has a far-reaching effect. The next problem: whether to design one package or to redesign the entire line.

The decision depends on a number of factors. Is the new product part of a family or will it be merchandized on its own merits? How good is the old design?

If you decide on a new package, it is usually good to retain elements that link the new product to the existing line, with the addition of features that define its own charateristics.

Here are two case histories that illustrate the pitfalls:

A manufacturer of tableware decided to introduce a gift package of his own to develop consumer recognition at the point of sale—jewelry stores. Current practice was for the jeweller to package the tableware as bought, usually in one, two, or three pieces at a time. The package had to be extremely flexible and also give an expensive appearance.

An ingenious triangular-shaped box was developed that met all the conditions except two. The package proved expensive to manufacture. But worst of all, jewellers refused to stock it.

In a success story, low-priced table decorations were packaged in a simple cardboard box with a cellophane window to show the goods. Display fixtures and other merchandising aids were supplied with the packages to encourage impulse buying.

Before starting on the design, the manufacturer studied consumer buying habits and determined the quantity to put in each package. Dealers reacted with enthusiasm. ●

How to Evaluate a Package Design

Trade mark

Copy

Logotype

Appeal Symbol

CHARACTERISTICS: New package is a lightweight polyethylene bottle. Uncluttered label has excellent visibility. It was designed for feminine appeal and impulse buying. Copy is on the back to keep the face as clean as possible.

THE most important parts of the package are the trade-mark, the logotype and the copy. By identifying and judging each part separately, you will find it easier to reach a reliable decision.

Trademark

The trademark establishes the company and the brand in the public mind; it endows the company and product with a unique and individual personality; and it provides a link for all of a company's products. There are four musts for a new trademark. A successful symbol must be:

Appropriate. A heraldry device is not effective for low-price products. A beautiful girl might be excellent for food and cosmetics but not for ethical drugs.

Distinctive. The form and shape must command attention wherever the trademark is displayed.

Flexible. It must be adaptable to widely different media.

An idea. Meaningless designs may look good on the drawing board, but they will never sell.

Logotype

Your company or brand signature can also be a trademark, so many of the principles of the trademark apply to the logotype. Above all, it must be usable on all corporate visual media—trucks, signs, different products, cartons, advertisements, etc. You must demand from the designer a balance between two conflicting requirements—distinctiveness and legibility. The human eye reads the total visual appearance of the work, not letter by letter. A name that is too easy to read might lack individuality; a complicated signature might be illegible.

Copy

Remember that, first and foremost, the package is an image that translates ideas into graphic form. All copy must be eliminated except the most essential.

It must reproduce the brand name and the company name. It must meet any pertinent laws or regulations. It must describe the product—and often give simple clear directions for its use. At least one line of "sell copy" is hard to argue against. "Most essential" copy is the key phrase.

Note: Although not one of the above key elements, an appeal symbol that buyers will identify with is a widely used device.

Study Each Product—and its Profit

● The ratio of profit to investment, for each product, can be an important tool for management.

● Use it as a guide for planning expansion, setting prices, measuring efficiency.

Digested from THE CONTROLLER, Oct., p463

"Profit is profit," some businessmen say. But if more than one product is produced, best selling products may be covering profits that are far too low, or non-existent, on others. One management tool of great value is the ratio of profit to capital investment—for each product.

This rate of return (see box below) can be used as a basic guide in planning future operations, as well as understanding the efficiency of current operations. It is a budget yardstick. It can be used as the basis for setting prices.

What should you do if a product is showing an unsatisfactory yield? Perhaps prices should be increased; perhaps the sales effort should concentrate on volume, with or without a price change; perhaps excessive costs could be reduced; perhaps the product should be discontinued.

Before a decision can be made, you have to know which products are returning an adequate profit.

What an adequate profit is, of course, is up to you to decide. It varies greatly between companies and industries, depending on the capital structure, the risks involved. The average earnings rate for an industry is not necessarily an indication of an adequate return.

Also, the return on investment is not the only consideration in the profit picture. Competition, not the rate of return, is the most compelling force in setting prices.

I. Start at the Top

The company's records can be progressively broken down by division, department, and product.

Let's start with the division. There should be a corporate division that carries records on long-term debt, capital, etc. It is also a prudent practice for this corporate division to carry excess cash and investments; the operating divisions can then be charged only with operating cash.

The investment in the division is its net assets, with property stated on a gross basis. Each division is charged with a fair prorated share of the company-wide expenses and liabilities.

To break divisions down into departments, separate production departments from service departments (such as the power plant and machine shop) and general office departments. Expenses and assets of service departments are charged on a prorated scale.

What is Rate of Return?

The rate of return is the percentage relationship of net income to capital investment.

Capital investment is the net worth of a company, plus long-term debt and reserve for depreciation. Net worth is the sum of all classes of capital stock and surplus. The reserve for depreciation is included in capital investment because it keeps the original investment intact. In determination of a company's net worth, the surplus is adjusted for write-ups and write-downs in the value of the property.

For comparative purposes, it is best to figure the rate of return before and after taxes. Taxes will vary widely over the years.

Department assets can be broken down into equipment, property, inventory, and other assets. Property value is allocated on the basis of land area and floor space. Exclude idle property. Be sure to allocate expenses and assets in the same ratio. Power plant expenses, for instance, can be allocated on the ratio of standard kilowatt hours used by the department, as compared to the total output.

Allocate general office expenses on the basis of estimated services.

For inventories, assign finished goods and goods in process directly to the producing department. Raw materials are assigned on the basis of consumption. Supplies also are charged by actual use; service department supplies are reallocated in the same ratio as the assets and expenses.

The other assets are prorated on the same basis used before: net current assets, exclusive of accounts receivable; inventories and cash in excess of normal requirements; and deferred charges, including insurance deposits. Cash over the normal-operation level is excluded because it can be thought of as a replacement fund.

Accounts receivable is a bridge between department and product breakdown. They can usually be assigned directly to the individual products.

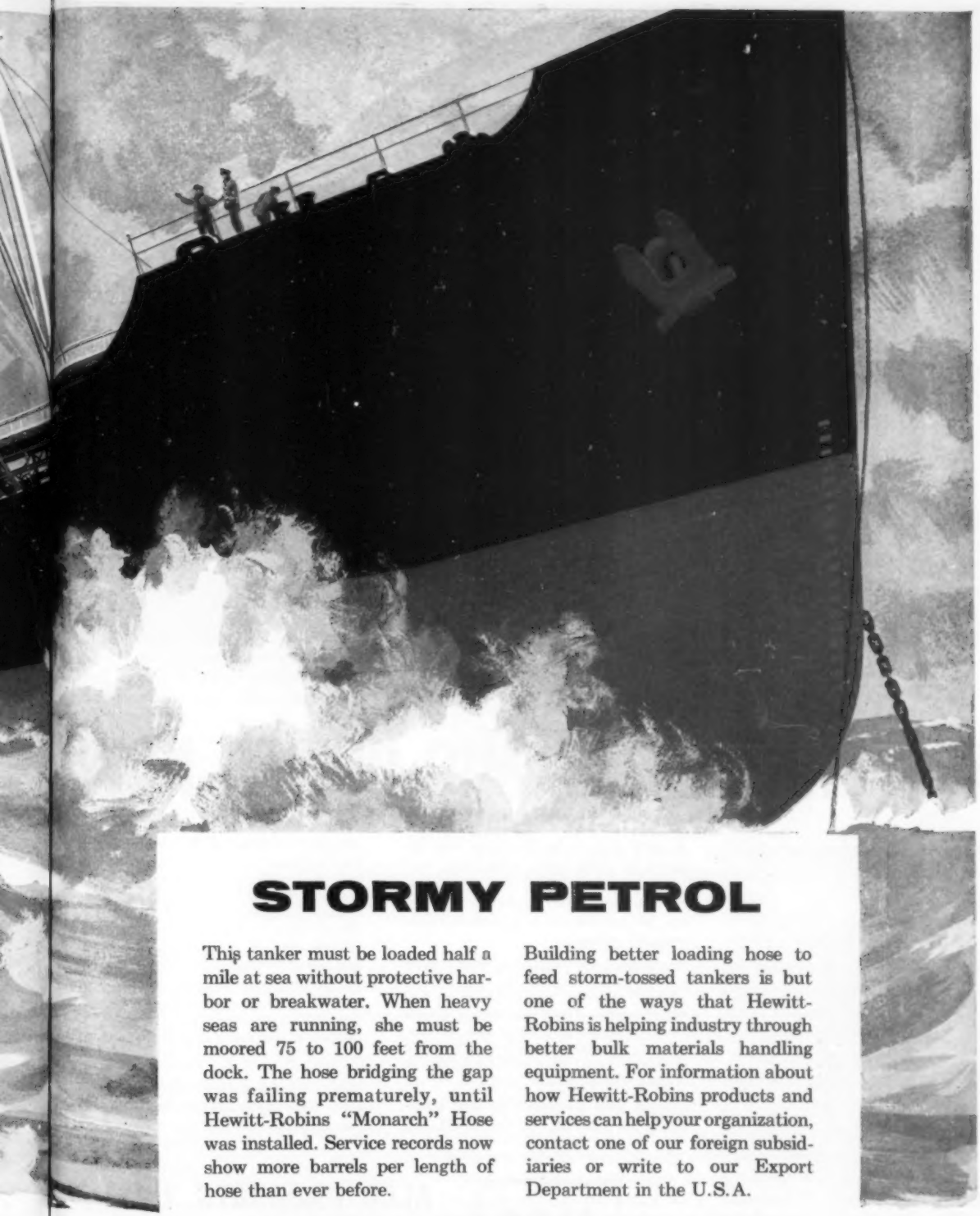
II. Now the Product

Products generally fall into three groups: (1) for sale, (2) for use in subsequent products, and (3) for both purposes. In general, the investment in each department follows the production sequence. For example:

Product A is sold as such and also used in the manufacture of **Product B.** Investment in **Department A** totals $200,000. During the period selected for the analysis of return on investment, 50,000 pounds of **Product A** were marketed, 150,000 pounds went into **Product B.** Therefore, the investment of $200,000 is split $50,000 for **Department A,** $150,000 for **Department B.** Figure com-

INTERNATIONAL DIVISION
STAMFORD, CONNECTICUT, U. S. A.

CANADA, Montreal, P. Q., Hewitt-Robins (Canada) Ltd., 2052 St. Catherine St., W.
ENGLAND, London W 1, Hewitt-Robins (Great Britain) Ltd., 8 Cavendish Place
FRANCE, Paris 2e, Hewitt-Robins Internationale, 9 Boulevard des Italiens
NETHERLANDS, Amsterdam, Hewitt-Robins (Holland) N. V. Vondelstraat 57
SOUTH AFRICA, Johannesburg, Robins Conveyors (S.A.) Ltd., P.O. Box 4736
EXPORT DEPARTMENT: *NEW YORK 17, N. Y.* Hewitt-Robins Incorporated, 370 Lexington Avenue



STORMY PETROL

This tanker must be loaded half a mile at sea without protective harbor or breakwater. When heavy seas are running, she must be moored 75 to 100 feet from the dock. The hose bridging the gap was failing prematurely, until Hewitt-Robins "Monarch" Hose was installed. Service records now show more barrels per length of hose than ever before.

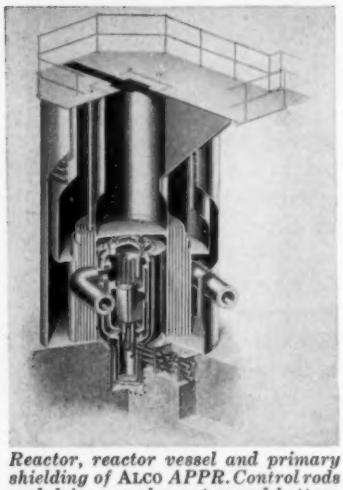
Building better loading hose to feed storm-tossed tankers is but one of the ways that Hewitt-Robins is helping industry through better bulk materials handling equipment. For information about how Hewitt-Robins products and services can help your organization, contact one of our foreign subsidiaries or write to our Export Department in the U.S.A.

HEWITT-ROBINS

NDUSTRIAL HOSE • CONVEYOR BELTING AND MACHINERY • VIBRATING EQUIPMENT • DESIGN, MANUFACTURE, NGINEERING AND ERECTION OF BULK MATERIALS HANDLING SYSTEMS • "JONES" POWER TRANSMISSION EQUIPMENT

Army Package Power Reactor (APPR) was designed and built by ALCO, *scheduled for completion in early 1957. Reactor will be operated at a heat rate of 10,000 Btu per second (10,000 kw). In construction at Fort Belvoir, Va., vapor container is at left, turbine room at right.*

YOU CAN GET ATOMIC POWER NOW



Reactor, reactor vessel and primary shielding of ALCO *APPR. Control rods and drive are shown top and bottom. Shielding consists of concentric steel cylinders with layer of water between each.*

ALCO's pressurized-water reactor plant is completely designed and engineered; scheduled for operation in early 1957. Similar plants can be purchased to generate commercial power.

Early next year, ALCO's atomic power plant will be in operation generating reliable power. ALCO is building the plant under the first fixed-price reactor contract awarded by the Atomic Energy Commission. Similar plants are available now to generate commercial power.

Design and engineering are complete. As a result, the cost of ALCO's atomic power plants, to about 12,000 kw, is lower than experimental reactors. ALCO's new nuclear criticality facility will further lower costs in reactor testing. Delivery time? Much faster than you'd expect.

Direct utilization of ALCO's atomic plants is economically justifiable in many locations where conventional fuel costs are high, transmission expensive or the location itself inaccessible. In such areas, an ALCO atomic power plant can mean a saving.

For full information relative to your specific project cable LOCOMOTIVE, New York.

ALCO

ALCO PRODUCTS, INC.
Foreign Sales Department
30 Church Street
New York 8, New York

Locomotives · Diesel Engines · Nuclear Reactors · Heat Exchangers · Springs · Steel Pipe · Forgings · Weldments · Oil-Field Equipment

plicated situations the same way.

Net income by product. Next, segregate the net income of the company into the individual products. If your company does sales and cost analysis, data on net sales and cost of goods sold are probably available.

Other items, however, cause difficulties. Selling expenses are particularly hard to isolate. A simple way is to prorate on the volume of sale, but this method distorts the true net income by product. To obtain the best breakdown, get the sales department to evaluate its effort for each product.

Some arbitrary allocations must be made. For several items involved in net income, an equal weighting of net sales, gross profit and investment in the product is a good basis for allocation. Administration and general expenses can be allocated on this basis. Development research can be assigned on the same basis; research spent on products can be charged directly.

Wherever possible, income charges and credits should be assigned to products; if not practical, use the equal weighting of net sales, gross profit, investment.

Provision for taxes can be applied at the current rate—based on the estimated income before taxes for each product.

III. Using the Results

With all the information in on net income and investment by product, calculating the rate of return is simple mathematics.

In using the rate of return as an index, there are several points to remember. A company should not expect to earn the desired return on an investment that is partially used. In setting price levels, the normal production level should be used. A price based on under production puts the consumer in a squeeze; over-production price setting is based on an abnormal condition.

As a gage, the rate-of-return idea can be useful in evaluating budget requests and expansion projects. For new products, capital requirements and expected annual income can be estimated. The estimated return on investment should be a primary consideration in evaluating new products. ●

▶ FINANCIAL DIGEST

The members are agreed: The "Hague Club" is working reasonably well. And its success will encourage more such "clubs" in international trade.

A little over a year ago Brazil signed, at The Hague, a multilateral payments union agreement with Britain, Germany, and The Netherlands. Since then, Belgium, Luxembourg, Italy, Austria, and France—all anxious to expand their Brazilian business—have joined in. The Scandinavian countries, Japan, and Portugal may be next.

One result: Brazilian importers were able to buy up $50-million worth of European currencies in the third quarter of 1956, compared to only $20-million in the second quarter. This means more imports—from Europe.

Another result: Argentina, struggling to put its own trade on a new footing, has set up a "Paris Club" with most of the same European nations—plus Japan and Scandinavia. In just a few months, the Paris Club seems to have helped stabilize the Argentine peso in European trade.

These clubs are modelled after the European Payments union; the members simply swap, or trade, their debts with Brazil. The currency of one of the members earned by Brazil can be used to pay for goods of any member. Balances are cleared through the EPU. An area of limited convertibility is established and trade benefits.

Other Latin American nations are studying the idea. Chile is interested in a club with Europeans. And Argentina, Uruguay, and Paraguay are talking of setting up a three-way payments union of their own.

This is something that Latin American economists have urged for years. They look on the club idea as an important step toward increased intra-Latin American trade (see MANAGEMENT DIGEST, August, page 16).

And you can speculate that the day may come when a Common Market and free trade zone in Europe (page 13) will carry on expanding trade with all of Latin America, on an almost completely convertible basis.

●

Here is how one manufacturer sold shares, and raised expansion capital, in a difficult money market.

Willys-Overland do Brasil plans a new factory at Sao Paulo to produce Jeeps. The company felt it needed about 150-million cruzeiros in operating capital. But the money market is tight—and most Brazilian investors avoid industrial shares.

So Willys and a local investment house launched a major promotion to sell shares. Twenty-five banks, seven brokers helped out; Willys bought radio time and full page advertisements in the newspapers. A 15-Jeep caravan, samba orchestras, and special motion pictures helped stimulate interest.

Willys offered (1) stock at 100 cruzeiros a share (most Brazilian issues start at 1,000); (2) for 500 shares the buyer gets an option to buy a Jeep at 10% discount; (3) installment purchases—40 cruzeiros a share now and the rest in monthly payments; (4) the hope of a 12% dividend.

After one week, Willys had more than 30-million cruzeiros (about $500,000). Said one broker: "Maybe this is the key to local financing in a credit-starved money market."

● Industry is using CATALYSTS more and more for a fast-widening variety of jobs. But nobody yet knows how a catalyst encourages two separate molecules to react and produce a new substance.

● Most promising theory (represented at right) is that molecules of two reacting substances (gray spots) are attracted to the surface of the catalyst. They apparently stick to that surface momentarily, react, then fly off leaving the catalyst ready for another round.

● Proving the theory will require a long-term basic research program. But medicine as well as industry has a mighty stake in solving the problems.

● That's why science sees . . .

A Rich Reward in Catalysts

Digested from BUSINESS WEEK, Sept 29, p141

Most of the world's production of gasoline, chemicals, synthetic rubber, and plastics depends on the work done by catalysts. Every year, more new products are added to the list. Yet nobody knows precisely how catalysts—the chemicals that produce fast changes in the structure of other substances—do their work. There have been some ideas, of course, but only highly theoretical.

For 10 years or more, the task of finding catalysts—that will produce the changes that industry requires—has been almost an art. It has depended largely on the industrial researcher's intuition, on trial-and-error tests, and laborious searching. (See box, next page, for what's happening in basic catalyst research.)

Now the job is quickly becoming more of a science. Researchers are working hard on the mysteries of the catalytic process. Industrial scientists believe that once they solve these mysteries, they will then be able to compound a vast range of new products. They will be able to predict in advance the catalysts that will change the character of known substances.

I. What Catalysts Do

Scientists, and most laymen, have long known what a catalyst can do. Here is an example: If you place a piece of natural protein—a beefsteak, for instance—in a solution of concentrated, 20% hydrochloric acid, the protein will react and dissolve completely in the strong acid. But it may take several days to dissolve. If you boil the acid you could shorten the time to one day.

But there is another way of dissolving the steak—without using heat and without long delay. That is to use a catalyst. If you add a small amount of the chemical pepsin to the concentrated acid, the steak will dissolve in three or four hours. Pepsin is the catalyst. In very small amounts it will speed up the reaction; yet it will not

lose its character by mixing with the protein or the acid, and it will not combine with either of them.

Other catalysts, in other reactions, do much the same job. In still other cases, it is only because of the catalyst's effect that a reaction takes place at all. Even high temperature and high pressure will not change the character of the molecules, as the catalyst is able to do.

II. Why Do They Work?

Science still has no sure answers to the questions of exactly why and how catalysts do these things. One reason for this gap in scientific knowledge is that a catalyst's behavior appears to be one of the most complex reactions in the whole field of solid state physics. But the scientists have some idea of how a catalytic reaction works.

They generally agree that the reaction of ethylene and oxygen in the presence of a catalyst is a typical one. In this reaction, here is what happens:

- Separate molecules of ethylene and oxygen, in solution, are attracted to the solid catalyst.
- The molecules stick to the surface, react, and join together to form ethylene oxide.
- The molecules, now linked together, fly off the catalyst's surface.
- That point on the surface of the catalyst where the reaction took place is left free for a further reaction.

All this happens in a fraction of a second, and continues until all available ethylene and oxygen molecules have been combined. The accepted theory of why the reaction takes place is that the solid catalyst's electronic structure attracts the separate molecules to its surface, encourages them to react, and then pushes the freshly-linked molecules away exposing the catalyst.

One way to prove this theory is by studying a simple catalytic reaction at extremely low temperatures. These low temperatures, near where helium gas becomes a liquid (−236° C.), slow the reaction so that researchers can "see" what is happening. But the areas they must see are measured in billionths of a square centimeter.

Two promising new instruments bring so small an area within the range of human sight:

- The electron field emission microscope, which can magnify up to 5-million times, is being used to study the motion of atoms across the surfaces of catalysts, and the forces required to (1) make the atoms stick to the catalyst's surface, and (2) drive them away once they are linked.
- The ion emission microscope, which can magnify up to 50-million times, is being used to determine exactly what molecules or atomic complexes will form on the surfaces of particular catalysts.

III. Catalysts and Life

Using these two new and powerful aids, catalytic researchers are hurrying to give industry the answers it would like to have. And they are being pushed on by medical researchers.

Medicine is vitally interested in an explanation of precisely on how catalysis works because the human body—like a modern chemical plant—employs catalysts all the time to keep itself going. Medical researchers, like their counterparts in industrial research, know little about these catalysts, which, in medical terminology, are called enzymes.

It is already known that the life of an industrial catalyst can be prolonged or restored to proper working order through regenerating, replacing, or increasing its oxygen. So some scientists maintain that it ought to be possible to restore human body enzymes. Compared to that promise, other possible results of the successful explanation of catalysis may seem inconsequential.

Also likely to be solved when scientists are able to design catalysts to suit a particular situation is the problem of air pollution. Oxidation catalysts are capable of initiating burning of fuel mixtures that would not normally be combustible. They will support combustion of mixtures that are too dilute or too cold to be ignited by flame. Therefore, they can be used not only to recover heat from the waste gases of industrial plants, but to rid the fumes of gasoline engines and industrial smokestacks of pollution materials.

The latest discovery in this field is a catalyst that burns the hydrocarbons in leaded gasoline, converting them into harmless products before they reach the air. ●

Progress in Catalytic Research

ONE measure of the increasing interest in catalysts and how they work can be found in the International Congress on Catalysis held in Philadelphia, Pa., U.S.A., last September. Scientists from all over the world gathered to discuss research in catalysis. These are some of the things they talked about:

Dr. Eugene J. Houdry, foremost American catalytic scientist, told the Congress that enzymes (the body's catalysts) hold the key to cancer. Enzymes promote the transformation of food into energy, and when they change their basic makeup they can lead to production of cancerous cells.

Research at the Indian Institute of Technology (Kharagpur) aims at synthesizing complex organic compounds from simple materials like carbon monoxide and water. In England scientists at the Atomic Energy Research Establishment (Harwell) are looking for a catalytic system that will inhibit metal corrosion. German scientists at the Technical University (Hannover) have a new method for studying catalytic processes. They hope it will lead to a better understanding of how catalysts work.

Even though the talks were highly technical, a layman could at least pick out some areas that would benefit by research—for instance: biochemistry, ways to get new products from crude oil and natural gas, new raw materials for plastics, air pollution problems.

What's New in World Research

LOW-TEMPERATURE research has led to the development of the cryotron, which can serve as a nearly perfect electronic switch. In its simplest form, the cryotron consists of a piece of wire about 0.25 centimeter long, wound with a layer of control wire.

The cryotron operates in a bath of liquid helium (a few degrees above absolute zero). At such temperatures many metals offer no resistance to electricity; they become superconductive. When the cryotron is cooled by liquid helium, the central wire can be made superconductive or resistive by raising or lowering the magnetic field created by the control current flowing in the surrounding coil.

Thus the cryotron performs the same functions as any electronic switch—it makes, breaks, or changes connections in an electrical circuit. And it can control a larger current than is required for its own actuation; in effect the cryotron is also a current amplifier. In all these functions, the cryotron competes with the vacuum tube or the transistor.

As yet the cryotron does not switch as fast as either the vacuum tube or the transistor. But its small size, low cost, and high reliability make it attractive for computer applications. For example: You may yet see a large-scale digital computer that will occupy only 0.03 cubic meter. This compares with 0.6 cubic meter for a transistor computer and 9 cubic meters for a vacuum-tube computer. (*Industrial Bulletin, Arthur D. Little, Inc., Sept*)

●

BRITAIN is spending about 2% of her gross national income on industrial research and development. But 60% of the funds go to military and defense projects financed out of governments funds. Net result is that only 2d. in every £ of income is spent on seeking and developing new ideas and products for civilian application. This is less than one-third the U.S.A.'s per capita spending on research. (*Metalworking Production, Sept* 21, *p*5)

●

A HUGE INSTITUTE for the study of the brain and nervous system will be built in Venezuela near Caracas. IVNIC—the Instituto Venezolano de Neurología e Investigaciones—will be the first institute of its kind in Latin America and one of the largest in the world. Eventually it will be an international research and training center.

Twenty-six buildings, constituting a recently completed "pilot unit," are now equipped. To date the Venezuelan government has spent about $5-million on the institute, but ten times this amount will be spent to build additional units, including a building for neurotropic virus research, a radiation laboratory to be equipped with a nuclear reactor for medical research, and other buildings.

R.C.Allen MODERN BUSINESS MACHINES

for greatest value and efficiency

R. C. Allen VisOmatic Typewriters

offer the greatest advancements for typing ease, speed and accuracy. "See it—set it—forget it" automatic margins save time and effort . . . quick-change platens multiply the machine's versatility . . . key tension, ribbon, and tabulator controls are within fingertip reach . . . and the automatic ribbon reverse saves ribbon wear. Available with Spanish, French, German, Italian, and other language keyboards and in Carbon Ribbon and "Electrite" electric models. Carriage widths 11 to 26 inches.

R. C. Allen VisOmatic Adding Machines

are available in hand and electric models, with 6 to 13 column capacity. Visible dials, automatic clear signal, Add-Speed keyboard, ciphers print automatically, automatic space-up to tear off blade on total, all subtractions and credit balances print in red. Electric models have motorized multiplication, subtraction, and automatic total from the plus bar. Direct credit balance available on most models.

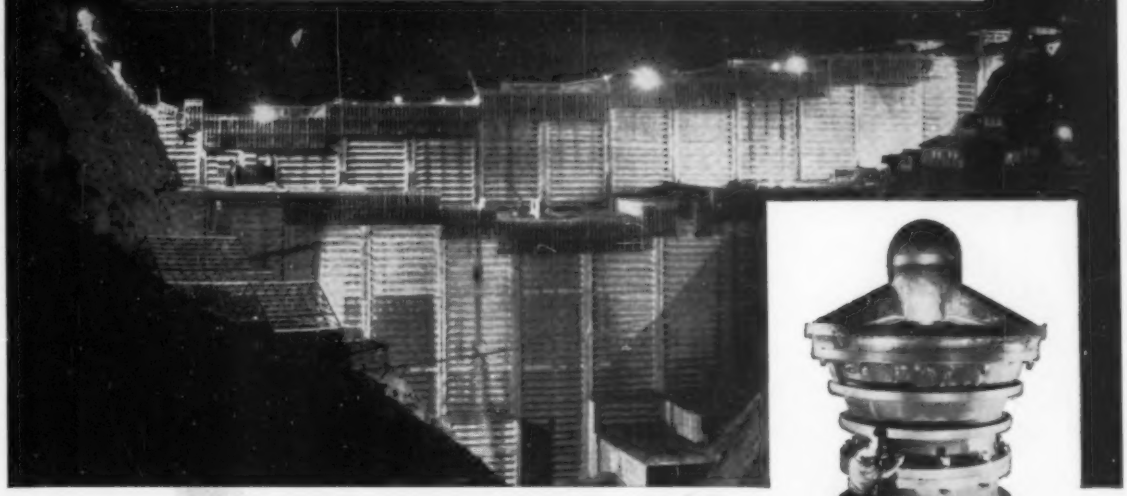
FOR INFORMATION about the complete line of R. C. Allen Machines for Modern Business Efficiency, contact your nearest R. C. Allen dealer. Distributors in principal cities throughout the world.

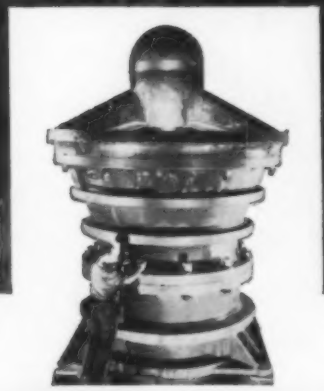
Exclusive sales franchises are available in a few areas . . . write for details.

R.C.Allen Business Machines, Inc.
EXPORT DIVISION:
450 Fourth Avenue • New York 16, N. Y., U. S. A.
GENERAL OFFICES: Grand Rapids, Michigan

The World's Highest Dam . . .

Built with the aid of an Allis-Chalmers crusher!



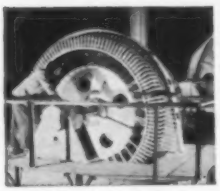


Allis-Chalmers serves the CONSTRUCTION INDUSTRY as it serves all the basic industries of the world!

"We have crushed a total of 1,700,000 cubic meters of boulders so far with our *Superior* gyratory crusher. It has been working 22 hours a day, to our entire satisfaction," say the builders of the world's highest dam, the Grande Dixence near Lausanne, Switzerland. The new dam, 921 feet high, will make possible the production of more than a billion and a half kwh of power per year.

The crusher used here is a product of over a century of engineering, manufacturing and installation experience by Allis-Chalmers—one of the world's leading machinery builders. Allis-Chalmers engineering and manufacturing ability can be applied to any industrial machine problem.

Now, through license agreements with leading firms throughout the world, certain types of Allis-Chalmers equipment are being manufactured abroad for purchase in leading world currencies. For complete information, contact your local distributor or write Allis-Chalmers, Industries Group, Export Department, Milwaukee 1, Wisconsin, U. S. A.



This crusher has given outstanding performance at Grande Dixence Dam. *Superior* gyratory crushers like this are in use throughout the world for crushing huge tonnages of stone, aggregate, taconite and other hard metallic ores. Allis-Chalmers crushers have proven unsurpassed for economy and dependability.

For Motor, Control, Drive Equipment, depend on Allis-Chalmers. Your local distributor can help you in selecting exactly the right unit or combination to meet your needs. Allis-Chalmers motors are available in a wide range of types and sizes to work with basic machines. A-C is the only company that can furnish your installation complete with motor, control and drive.

ALLIS-CHALMERS

Superior and *Texrope* are Allis-Chalmers trademarks

5066G

ALLIS-CHALMERS DISTRIBUTORS LOCATED THROUGHOUT THE WORLD

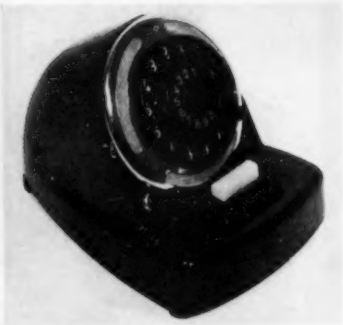
Products of the Allis-Chalmers Industrial, Electric Power and General Products Divisions are distributed by firms in these cities. Distributors of Tractor Division products also are located in principal cities.

ALASKA—Fairbanks.
ARGENTINA—Buenos Aires.
AUSTRALIA—Sydney.
BELGIAN CONGO—Elisabethville.
BELGIUM—Brussels.
BOLIVIA—La Paz.
BRAZIL—Rio de Janeiro, São Paulo, Recife (Pernambuco), Porto Alegre.
BRITISH BORNEO—Sandakan, Jesselton.
BURMA—Rangoon.
CANADA—Montreal.
CHILE—Santiago.
COLOMBIA—Barranquilla, Bogotá, Medellín, Cali.
COSTA RICA—San José.
CUBA—Havana.
DOMINICAN REPUBLIC—Ciudad Trujillo.
ECUADOR—Quito.
EL SALVADOR—San Salvador.
ENGLAND—London.
FINLAND—Helsinki.
FRANCE—Paris.
GREECE—Athens.
GUADELOUPE—Pointe-à-Pitre.
GUATEMALA—Guatemala City.
HAITI—Port-au-Prince.
HAWAII—Honolulu, Hilo.
HONG KONG—Hong Kong.
ICELAND—Reykjavik.
INDIA—Bombay, Calcutta.
IRAN—Teheran.
IRAQ—Baghdad.
ISRAEL—Tel-Aviv.
ITALY—Milan.
JAMAICA—Kingston.
JAPAN—Osaka, Tokyo.
KENYA—Nairobi.
MALAYA—Kuala Lumpur, Ipoh, Kota Bharu, Penang, Malacca, Seremban, Kuantan.
MEXICO—Guadalajara, Mexico City, Monterrey.
NETHERLANDS—Amsterdam.
NEW ZEALAND—Wellington, Auckland.
NICARAGUA—Managua.
NORWAY—Oslo.
PAKISTAN—Karachi.
PANAMA—Panamá City.
PARAGUAY—Asunción.
PERU—Lima.
PORTUGAL—Lisbon.
PUERTO RICO—Ponce, San Juan.
REPUBLIC OF INDONESIA—Djakarta, Surabaja, Medan, Palembang, Bandoeng, Semarang, Makassar.
REPUBLIC OF THE PHILIPPINES—Bacalod City, Cebú, Manila, Negros Occidental.
SARAWAK—Kuching, Sibu, Miri.
SINGAPORE—Singapore.
SOUTH AFRICA—Johannesburg.
SPAIN—Madrid.
SURINAM—Nieuw-Nickerie, Paramaribo.
SWEDEN—Stockholm.
TAIWAN—(FORMOSA)—Taipei.
TANGANYIKA—Dar es Salaam.
THAILAND—Bangkok.
TRINIDAD—Port of Spain.
TURKEY—Istanbul.
VENEZUELA—Caracas.

ALLIS-CHALMERS MANUFACTURING COMPANY, Industries Group, Export Department, Milwaukee 1, Wisconsin, U. S. A. Factories in U. S. A., England and Canada.

What will tomorrow's office be like? You got a glimpse at the National Business Show, held at New York City's Coliseum in October. The trend seems to be toward still more automatic data processing, particularly common-language systems. (See opposite page) But more conventional office equipment is not standing still. Below is a sampling of equipment seen at the show.

New Office Equipment



Automatic Communications

The "Sound-O-Phone" is a completely automatic dial communications system which has no limitations on the number of extensions. It combines the operating features of interoffice-communications boxes and the telephone. **(Electro-Vox Intercom Corp., 270 Park Ave., New York 17, New York, U. S. A.)**

Book Binder

Portable Plastico hand-operated punching and binding equipment is available for office use in binding portfolios, presentations, sales manuals.

Model No. 24 binding machine quickly produces perfectly bound books up to 1⅛ inch thick. Pages and cover are inserted in the proper position, a lever is pulled, and the book is bound. **(Plastic Binding Corp., 730 S. Sherman St., Chicago, Illinois, U. S. A.**

Data Processing

The File-Computer is the newest in the Univac electronic data processing systems. Applicable to the entire range of business functions, it combines a high-speed computer with a self-activated record keeping system.

The File-Computer can work with punched cards, punched paper tape, magnetic tape or combinations of the three; it can take in data by way of punched cards, for example, and print the results of the computation on magnetic tape. It can handle several unrelated types of transactions at the same time, with data fed into the many as 24 input sources. **(Remington Rand International, 315 Fourth Ave., New York 10, N. Y., U. S. A.)**

Portable Electric Typewriter

Only four pounds heavier than standard portables made by the same company, this new electric typewriter has most of the features of the bigger electric machines. Automatic repeat action is available on the hyphen and underline keys as well as on the space bar. It is also available on special order for any or all keys.

The machine is fast, has a light touch, and makes many carbon copies. But the typist will still have to return the carriage to the starting position by hand. The typewriter operates on regular 110-volt, 60-cycle alternating current only. **(Smith-Corona, Inc., 700 East Water St., Syracuse, New York, U. S. A.)**

Single Cycle Mimeograph

A single cycle mimeograph is designed for highly repetitive duplicating. It differs from conventional electric mimeographs, which are designed for continuous operation, in that one press of a foot switch permits the cylinder of the machine to turn exactly one revolution. **(A. B. Dick Co., 5700 W. Touhy Ave., Chicago, Illinois, U. S. A.)**

Automatic Typewriter

The Robotyper produces individually typewritten letters at high speed and at a fraction of the cost of manual typing. It will produce complicated tabulation and statistical work—almost anything that can be done on a typewriter can be done on a Robotyper. **(Robotyper Corp., 2 Park Ave., New York, New York, U.S.A.)**

Combined Calculator

Two registers and a "memory" make it possible for this new electric printing calculator to perform a sequence of combined operations automatically. Results of any calculation can be transferred to the "memory" of the Tetractys for further use. Operations and re-

sults are clearly identified by appropriate symbols on a printed tape. **(Olivetti Corp., Via G. Jervis, Ivrea, Italy.)**

Typewriter Feeder

The Snapset Automatic Feeder automatically feeds single-set one-time carbon forms directly into any typewriter or billing machine. **(American Business Systems, 2929 B Street, Philadelphia 34, Pennsylvania, U. S. A.)**

Dictating Machine

Soundscriber "56" dictating equipment features a new "Ultradyne" loudspeaker. Switch selects either microphone or speaker for playback review. **(Sound-Scriber Corp., 146 Munson Street, New Haven, Connecticut, U.S.A.)**

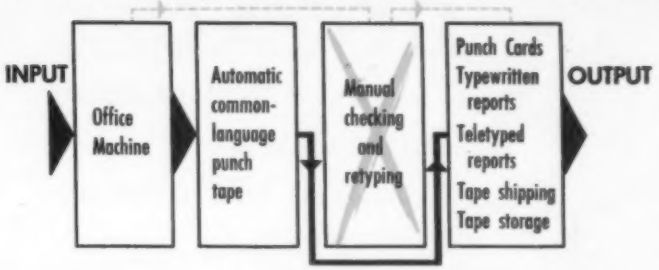
Duplicator

The Roneo 750 duplicator has automatic inking, gives precise registration, and automatically stops when the predetermined number of copies is printed. "Ejecto-Strip" neatly stacks finished copies, and "Lino-Matic" copy leveller automatically adjusts a stencil typed out of alignment. **(Roneo Ltd., 17 Southampton Row, London, England.)**

Intercom Control Center

Medium-sized and medium priced, a new intercommunication control center is designed to meet a wide range of business needs. Featuring a dual channel system, it combines the advantages of standard intercommunication systems with those of the large consoles. It provides interoffice communication, music distribution, paging for up to 48 locations. **(Webster Electric Co., Racine, Wisconsin, U.S.A.)**

Turn the page for more office equipment



The Trend in Office Machines

The latest trend in automatic office equipment is the use of the "common-language" system in office records.

For example, an adding machine can be set up to automatically punch a tape at the same time it prints its own figures. With a decoding device, this tape will reproduce the figures on other machines in the office system—an automatic typewriter, or a punch-card machine.

The coded tape can also be transmitted to distant offices by teletype equipment. And the tape, lighter than punch cards bearing the same amount of information, can be shipped for processing at other locations or stored for future use. In effect, common-language tapes eliminate operations such as checking and retyping on punch-card machines. (see diagram above)

Here are descriptions of some of the new systems:

The Sensimatic-To-Punched-Tape System is based on Burroughs' standard accounting machine. An electrical control unit will accommodate up to 16 combinations of punching instructions, both characters and numbers. To use the prepared tape on a card punch, a decoding device is programmed according to Sensimatic carriage positions.

The common-language tape is punched at the same time that the accounting machine records its data on ledgers, statements or receipts. Since the operation of the tape-punching unit is completely automatic, it can be located anywhere up to 93 meters away. **(Burroughs Corp., Detroit 32, Michigan, U.S.A.)**

The Intercopuler is a device for connecting an International Business Machines Corp. card punch to a Burroughs billing machine. It attaches to the rear of the Series M200 multiplier. Using the Intercopuler, a punched card is automatically produced from the billing machine. **(Systematics Inc., 30 Hermosa Beach, California, U.S.A.)**

The Monroe Auto-Punch works with the company's adding or accounting machines. It is available in single, double, and multiple-register models, any of which can be equipped for 5, 6, 7, or 8-channel punching. Automatic extra features can be provided. **(Monroe Calculating Machine Co., Orange, New Jersey, U.S.A.)**

Typatape is a mechanical attachment for all types of business machines. It produces coded tapes from cash registers, hand and electric adding machines, and accounting machines. **(Typatape, Inc., 525 Lexington Ave., New York 17, N. Y., U.S.A.)**

Friden's Computyper is a common-language machine combining automatic writing and automatic calculating. Equipped with automatic tape-punch and reader, it interprets and records both alphabetical and numerical data. The Computyper also interprets data fed to it on tape punched by other common-language machines. **(Friden Calculating Machine Co. Inc., San Leandro, California, U.S.A.)**

Ask the secretary who uses it (and her wise boss who bought it) and they'll both tell you that *only* a Royal typewriter is designed with "built-in efficiency" . . . the result of more than half a century of typewriter manufacturing experience.

A work-saving, time-saving precision-built machine, each Royal typewriter gives beautiful results, day after day, year after year. Exclusive features such as the Magic® Margin, "Magic Tabulator" and Touch Control® make typing a joy . . . increase the work output. Your correspondence looks neat, crisp, handsome . . . and copies are *unbelievably* clear.

Make a mental note right now to call your Royal dealer for a demonstration tomorrow. You . . . and your office staff . . . will be mighty glad you did!

World's largest manufacturer of writing machines . . . with sales and service everywhere!

ROYAL®

ROYAL McBEE INTERNATIONAL Manufacturers and Distributors of Royal Typewriters and McBee Accounting and Statistical Systems

Bookkeeping Machine

A new bookkeeping machine combines the advantages of front-feed insertion with many automatic features, making it adaptable to a wide variety of posting jobs.

The machine features automatic balances and sub-balances; carriage tabulation, return and opening; date printing with reference numbers, amounts or totals; symbol printing with amounts in any desired column; control of posting operations by one "multi-purpose" motor bar; and vertical spacing and carriage return by vertical motor bar. **(The National Cash Register Co., Dayton 9, Ohio U.S.A.)**

Letter Opener

Designed for modern mail opening methods in offices where high-speed equipment is not justified by volume, the Lightning letter opener opens all standard envelopes at an average of 70 pieces per minute without cutting contents. Higher speed models are available with electric or hand power. The speeds vary from 200 to 300 letters per minute. **(The Bircher Co., Inc., 192 Mill St., Rochester 14, New York, U.S.A.)**

Automatic Typing Unit

Model 5630 Selector Auto-Typist is built to operate any electric typewriter. It provides 30 push-buttons for automatic selection of letters or paragraphs from previously prepared record rolls. **(American Automatic Typewriter Co., 2323 N. Pulaski Road, Chicago 39, Illinois, U. S. A.)**

Electronic Stencil Cutter

Electro-Rex, an electronic stencil cutter, produces stencils or plates from practically any graphic material. The original may be a drawing, office form, typed matter or screened photograph. It may be an original layout or a clipping from a previous publication, or it may be a combination of both. **(Rex-Rotary Distributing Corp., 387 Fourth Ave., New York, New York, U. S. A.)**

Time-tested and performance-proved the world over in . . .

Ten billion kilometers of transportation service!*

The 'Jeep' Truck. This all-purpose 4-Wheel-Drive Truck hauls loads of more than a ton, in good weather or bad. In low-low gear it climbs grades as steep as 65%, fully loaded.

New model CJ-6 'Jeep'. Longer wheelbase, 50% more cargo area, and increased payload capacity. It has all the features that made the standard 'Jeep' famous.

The 'Jeep' Station Wagon. This 4-wheel drive utility vehicle carries up to 110 cubic feet of bulky cargo, or up to seven adults wherever they have to go, on or off the road.

Rugged 4-Wheel-Drive 'Jeep' Vehicles have stood the test of time, have proved their stamina and go-anywhere ability through billions of kilometers of the most difficult transportation assignments.

Through the years, all the world has been the 'Jeep's' proving ground. In every continent—on the plantation, in industry and public service—this versatile vehicle has stood the test of an endless variety of climates, has conquered every possible type of on or off-the-road driving condition, to operate with maximum efficiency and economy.

Time-tested and performance-proved, too, is the Willys-Overland Export Corporation's world-wide network of distributors and dealers. They have the knowledge to assist you with all your transportation problems, and to supply you with genuine Willys parts and authorized service to assure the continued top performance of your 'Jeep' vehicles.

The 'Jeep' family of 4-Wheel-Drive vehicles

Willys-Overland Export Corporation, Toledo 1, Ohio, U.S.A.

*This is conservative. Some estimates place the mileage at more than fifty billion kilometers.

Hydraulic Fluid Eliminates Combustion

Irus Fluid 902 is a "snuffer" type hydraulic fluid whose fire-resistant qualities prevent it from burning on contact with flames, heated metal surfaces, or molten metal. A formulation of water, petroleum hydraulic oil and emulsifying agents, the fluid is designed for applications where hydraulic leaks or line ruptures would contribute to fire or explosion hazards.

The fluid eliminates possibility of combustion by releasing its water content as a protective steam blanket to quench fire. This "snuffer" action reduces local temperature and displaces oxygen from the immediate area; in most cases the remainder of the hydraulic fluid will not support combustion. The oil will continue hydraulic action should the water be dissipated from the system.

The fluid is non-corrosive on ferrous and most non-ferrous metals and is colored a bright yellow to permit recognition and location of possible leaks. **(Shell Oil Co., 50 W. 50th St., New York 22, New York, U.S.A.)**

•

New Refractometer Operates Easily

In 60 seconds the operator can load, light, and look into this Abbe-3L refractometer to obtain the refractive index of liquids, dissolved solids, and some opaque solids. It can perform as a quality-control tool in the food, chemical, petroleum and other processing industries.

Design innovations incorporated in the instrument make it useful for production line applications where it can be operated by non-technical workers. Loading the refractometer has been simplified by mounting the prism assembly in front of the operator within easy reach, and in a horizontal position to reduce spillage. Readings are taken with a single eyepiece, from a convenient sitting position. **(Bausch & Lomb Optical Co., 635 St. Paul St., Rochester, N. Y., U.S.A.)**

Sound Measures Thickness

Sonizon uses sound you cannot hear to measure thickness you cannot see. Its portability (weighs only 30 pounds) and accuracy (to ±1% of thickness) suit many on-the-move applications. It can detect defects in forming, welding, casting or bonding operations.

Only a single probe is needed to measure the thickness from one side of almost any sound-conductive material—including metals, alloys, glass, plastics, hard-rubber. As a crystal touches or slides over any of these surfaces, ultrasonic (inaudible) sound waves are electronically translated into thickness readings on the calibrated scale right on tube face. Sonizon provides direct reading on a 3-inch "screen" for six thickness ranges, from 0.014 to 0.500 inch for steel. **(Magnaflux Corp., 733 W. Lawrence Ave., Chicago, Illinois, U.S.A.)**

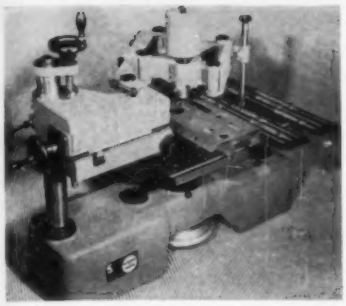
•

New Turbo-Charged Diesel

A new air-cooled exhaust turbo-charged diesel engine is reported to be useful for high-altitude operation of trucks, construction machinery, pump sets, diesel-electric units, and mining machinery.

The engine is available in two models. One eight-cylinder model has a rating of 210 horsepower and weighs less than 2,000 pounds. The other model has twelve cylinders with a rating of 310 horsepower. It weighs less than 2,900 pounds. **(Klockner-Humboldt-Deutz AG., Cologne, Germany)**

STAR
STAR
STAR
STAR Molyflex
STAR Molyflex
TRADE MARK
STAR BLADES
Specify one of these blades and you will get the most efficient and economical metal cutting possible today!
STAR MOLY HIGH SPEED
STAR HIGH SPEED
STAR Molyflex HIGH SPEED STEEL
WELDED-EDGE
Inquiries invited from established agents in certain areas.
CLEMSON BROS., Inc.
Middletown, New York, U.S.A.
3030
MAKERS OF HAND AND POWER HACK SAW BLADES, FRAMES, METAL AND WOOD CUTTING BAND SAW BLADES AND CLEMSON HAND AND POWER LAWN MOWERS.



Pantograph Engraver

This engraving machine weighs only 30 pounds, and provides high-precision all-purpose engraving at low cost. Designed so anyone in the shop can do his own engraving without training or trouble, Model SD combines a fixed-ratio pantograph with a series of grooved stencil-alphabets. By simply following the grooves with the tracing stylus, engraving may be done as rapidly as hand-lettering.

Clamps hold stencils and workpiece in rigid relationship; a high-speed cutter on the pantograph does the actual engraving. The machine engraves all materials, from plastics to steel, and accommodates workpieces up to a foot high. **(Scripta Machines A Graver, 7, Passage Turquetil, Paris 11, France)**

●

Honing Process Improves Hardened-Gear Qualities

The noise level of running gears can be reduced by a newly-developed "Red Ring" process that applies honing principles to the finishing of hardened gear teeth. The process should be applied to hardened spur or helical gears with teeth generated in the soft state, heat-treated, and furnished with conventionally ground locating holes.

Tooth honing is made possible by the development of two high-speed gear hones, which operate in conjunction with a gear-tooth honing tool. Model GHA, equipped with automatic loader, has tool drive with head and tailstock spindles that can rotate up to 3000 rpm. or more. Model GHB universal gear hone is used when more tooth correction is desired. With manual or semi-automatic loading, gears up to 8-inch pitch diameter can be honed; with automatic loading the machine accommodates 3-inch pitch diameter gears. **(National Broach & Machine Co., 5600 St. Jean Ave., Detroit, Michigan, U.S.A.)**

●

Portable Conveyor

A new, portable, power-driven conveyor can be wheeled to a work location by one person. It is suitable for truck loading, horizontal conveying and stacking. It can be placed in a vertical position for storage.

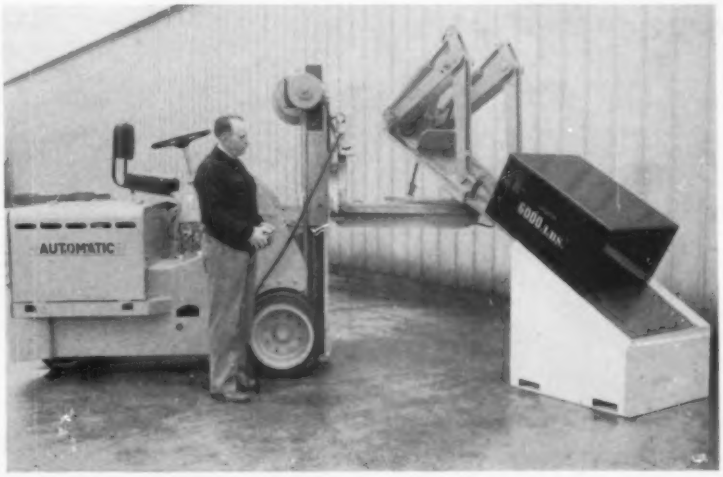
The belt is 14 inches wide and made from three-ply rubber impregnated cotton, perforated to form a gripping surface. Material can be conveyed to a maximum height of 6 feet with a maximum distributed load of 100 pounds. Overall dimensions are: length 8 feet 11 inches, width 2 feet 3½ inches, and height 1 foot 10¼ inches. The motor is ¾ horsepower, and drives through spur reduction gears. **(Gardiner's Conveyors Ltd., Wolseley St., London, S.E. 1, England)**

●

Fluid Drive for Low Horsepower Applications

Class 2 adjustable speed fluid drives for 1 through 25 horsepower applications are suited for automated installations where minimum maintenance, automatic speed adjustment, and positively uniform accuracy of repeat speed settings are prime considerations.

The units protect drive motors and driven machinery from shock loads, torsional vibration, and excessive torque. They can be used with conventional single-speed electric drive motor to provide adjustable, stepless speed control. Speed adjustment can be manual or automatic. Where a 2-directional motor is used, the fluid drive and load can be reversed while in motion by merely changing motor rotation. **(American Blower Corp., Detroit 32, Michigan, U.S.A.)**

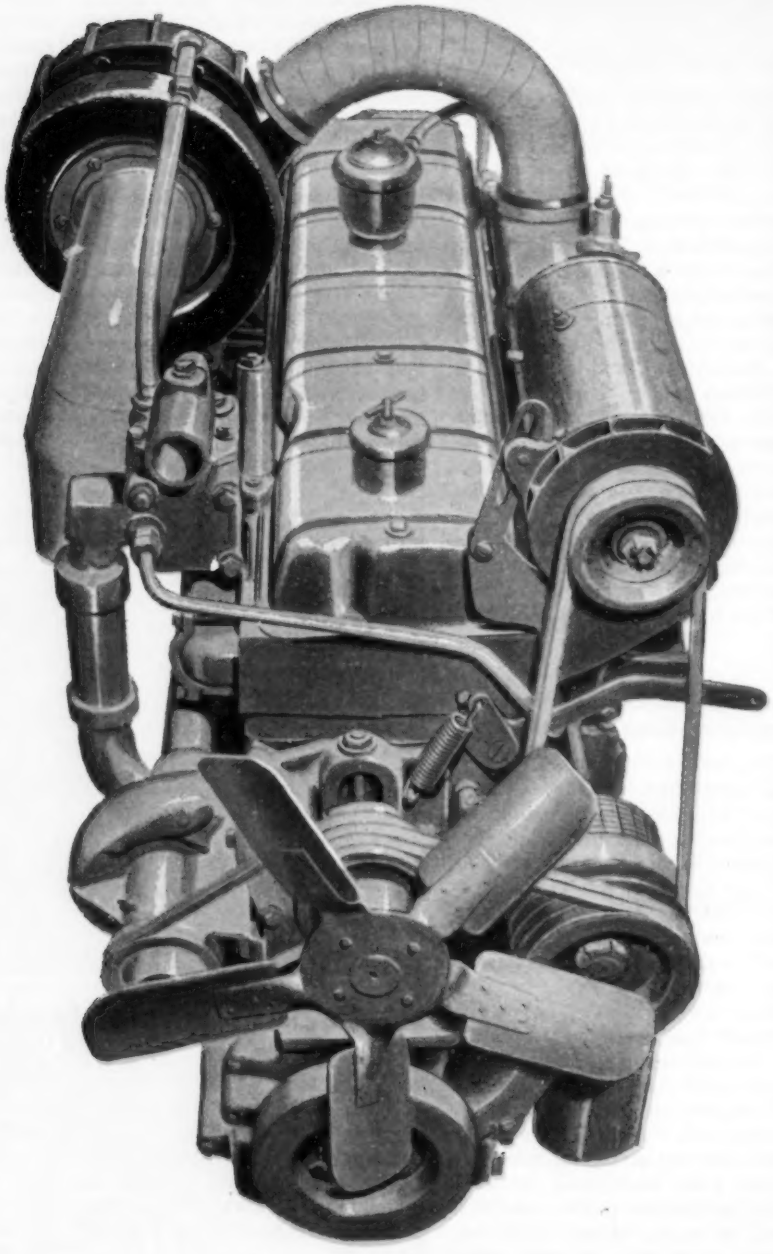


New Die-Handler for Inclined Presses

This fork-truck attachment for handling dies has these features: (1) The table rotates 180 degrees, giving the truck holding the unit a greater freedom to maneuver. (2) The table tilts, permitting the operator to position and retrieve dies in presses inclined at an angle of up to 45°.

Shown above, the attachment is mounted on an electric-driven truck. It works off the truck's hydraulic system and is controlled by a portable pushbutton panel. It can be mounted or dismounted quickly by disconnecting two hydraulic lines and removing two bolts. The attachment handles dies weighing up to 6000 pounds. **(Automation Transportation Co., Div. of Yale & Towne Mfg. Co., 53 W. 87th St., Chicago 20, Illinois, U.S.A.)**

175 h.p. CUMMINS



CUMMINS JT-6 TURBODIESEL

Governed RPM.....2500
Number of cylinders....6
Net weight with standard accessories....1615 pounds
Brake horsepower....175
Bore and stroke....4⅛"x 5"
Piston displacement....401

In 1955, for the fourth straight year, Cummins Diesels powered more new trucks in the U.S.A. than all other makes of diesels combined!

TURBODIESEL® ENGINE

Check the advantages of the JT-6 *TURBODIESEL*® Engine:

- **Maximum Fuel and Maintenance Economy** —More than 300 million miles of on-the-job performance prove the JT-6 gives maintenance costs as low as gasoline plus a 25% saving in maintenance hours!

- **Lightweight**—The JT weighs 450 to 800 lbs. less than other diesels of comparable power, enabling diesel truck operators to carry additional pounds in payload.

- **Turbocharging**—Exhaust gas energy normally wasted is now utilized, boosting usable horsepower at the flywheel for maximum performance and efficiency.

- **Simplest Fuel System**—Cummins exclusive PT fuel system is foolproof . . . simpler and easier to service than any other diesel or gasoline fuel system.

- **Simple, Rugged Design**—Cummins famous heavy-duty engine construction means more operating hours between overhauls. The proven superiority of the basic four-cycle, valve-in-head design gives long life.

- **Nearby Service and Parts Protection**—Over 300 Cummins maintenance points throughout the world are devoted to the care and service of diesel engines.

JT-6 now available in these famous-make trucks

AUTOCAR • DIAMOND T • FEDERAL
FOUR WHEEL DRIVE • INTERNATIONAL (Emeryville Works)
INTERNATIONAL (Fort Wayne Works)
KENWORTH • REO • WHITE

CUMMINS MORE PROFIT

gives you the big plus

Get full details of Cummins JT-6 *TURBODIESEL* engines from the distributor near you, or mail this coupon today!

Cummins Diesel Export Corporation
Columbus, Indiana, U.S.A.
Cable: CUMDIEX

I am interested in the JT-6 *TURBODIESEL* engine. Please send me, free of charge, additional information on this engine.

Name_____

Company_____

Address_____

City_____ Country_____

MD-12

Versatile Tow Tractor

Canada's new "Muskeg" tractor carries workers and supplies over snow, swampland, sand. The tractor is powered by a Chrysler Industrial 115-horsepower engine and has a top speed of 25 miles per hour.

Each of two models of the tractor features a one-piece watertight frame, flexible suspension, a choice of 3- or 4-speed transmission, and endless rubber tracks that run silently. Model J has a single track with 16 ounces per square inch ground pressure. Model M has double tracks and only 12 ounces per square inch ground pressure. **(Bombardier, Ltd., Valcourt, Quebec, Canada)**

CONSULTING SERVICES

GOOD INVENTORY MANAGEMENT

Releases tied up working capital—gives better customer service—releases space for profit making activities.

INTERNATIONAL DIVISION
METHODS ENGINEERING COUNCIL
718 Wallace Ave., Pittsburgh 21, Penna USA
CONSULTANTS TO MANAGEMENT
DR. H. B. MAYNARD *Pres.*
DONALD E. FARR *Vice Pres. Latin. AM*

SAN FRANCISCO MADRID BUENOS AIRES
NEW YORK SANTIAGO GOTEBORG

CONSULT THESE SPECIALISTS . . .

when you need professional assistance in solving difficult problems. Their specialized knowledge and broad experience can prove invaluable in saving both time and money for you.

MANAGEMENT DIGEST invites other consultants to list the special services they offer on these pages.

New Tube Expected to Reduce Cost of Color TV

A new type of cathode-ray tube, the "Lawrence tube" (named for its developer, Ernest O. Lawrence, a University of California physicist) should be simpler to make than the tubes now going into color television. The "single gun" electronic focusing tube (as opposed to the three-gun shadow mask types now on the market) is to be used in color television sets expected to be as much as $200 cheaper than sets now available.

Now in experimental production, the Lawrence tube does not require as close dimensional tolerances as the three-gun tube. Television engineers claim that a tube that is slightly out of mechanical alignment can be corrected electronically by adjustments in the receiver, much as can be done with standard monochrome tubes. That, they say, would cut down the number of rejects in the manufacturing process and ease up on the difficult quality control requirements.

An added benefit is that the "back end" of a Lawrence tube differs very little from the standard black and white type. That means the tube may be able to use internal and external components that are already in mass production. **(Allen B. Dumont Laboratories, Inc., 750 Bloomfield Ave., Clifton, New Jersey, U.S.A.)**

●

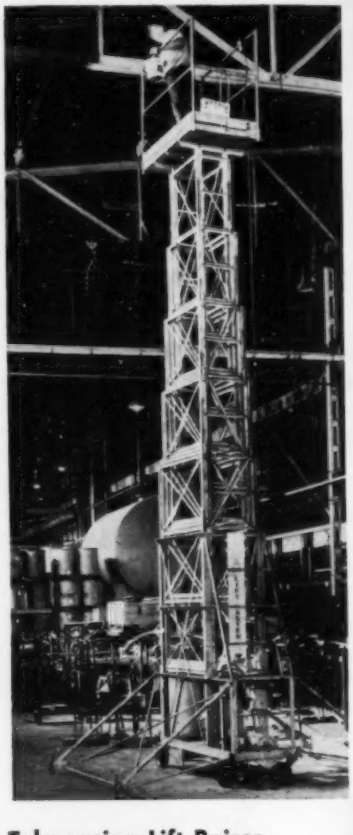
Two Treads, One Tire

A new tire, called "Dual 90," gives the driver the effect of two tires on one wheel. It is constructed with dual curvature that results in two distinct radii within each tire. This means that each tire has two separate points of contact with the road instead of one. Curvature is the term used by the tire industry that determines the contact between the tread of the tire and the road.

The manufacturer claims the dual curvature provides increased safety and durability. Maneuverability is also greatly improved.

The Dual 90 looks different than the conventional tire. It has two distinct treads with a groove running down the middle. The groove gives flexibility to the center, allowing the dual treads to work independently for better rolling contact. **(The General Tire & Rubber Co., Akron 9, Ohio)**

●



Telescoping Lift Raises Maintenance Man 40 Feet

A hydraulic platform lift, operated by one man and called "Ski-Ride," telescopes to any height between 9 feet and 40 feet and locks in position while a workman does maintenance or repair jobs from a 28x48-inch work platform on top of the mast. The lift rolls from job to job on four 10-inch wheels. Capacity of the unit is 500 pounds.

Safety features include steel rails, a toe-board around the work platform, and outriggers that open to 10 feet 9 inches. Four bronze-bearing roller chains support each section of the mast. **(Allied Manufacturing & Sales Co., 3101 W. Grand Ave., Chicago 22, Illinois, U. S. A.)**

Treatment Protects Clothes From Spots and Stains

"Scotchgard" is a fluorine compound developed to protect cloth from oil-based stains—such as those caused by gravy and salad dressing—as well as water-based spots. Scotchgard treatment protects cloth from these spots by making fabrics resistant to "wicking"—or soaking up liquids. The fabric does not absorb the liquid that causes the spot; most of the liquid runs right off. Some, however, will be pressed between the fibers of the cloth and must be wiped away. This can be done easily with the application of a household solvent.

Scotchgard is applied to fabric at the end of regular textile finishing processes. In most textile mills, little or no extra equipment is needed. **(Minnesota Mining & Manufacturing Co., 900 Farquier Ave., St. Paul 6, Minnesota, U.S.A.)**

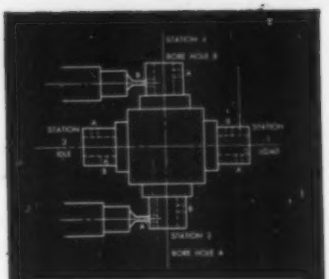
●

Variable Speed Motor—Take-off shaft and motor are on the same side, ideal for use where weight distribution and limited space is a factor. "Varidrives" (up to 5 horsepower) provides slow speeds, high torque, without gear boxes or speed changes. **(U. S. Electrical Motors, Inc., Box 2085, Terminal Annex, Los Angeles 54, California, U. S. A.)**

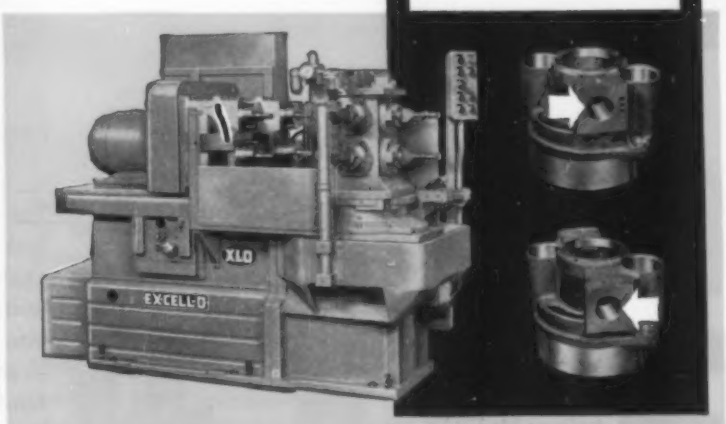
BOOST PRODUCTION, CUT COSTS WITH

Ex-Cell-O

Precision Way Machines



Plan view shows all four stations. Spindles are set off center to the fixture to machine cylinder bores A and B which are in different planes.



The Style 54 One-Way Machine equipped for boring, counter-boring and chamfering operations on compressor crankcases. The station nearest the push button panel is the loading station. Loading is done at this station during the machining cycle. On parts shown at right, the arrows indicate completed cylinder bores, emphasize difference in plane.

Ex-Cell-O machines are continually proving their ability for high production on many types of precision operations. One example is this standard Ex-Cell-O Style 54 One-Way Machine which bores, counterbores and chamfers compressor crankcases for refrigeration manufacturers.

Precision and high productivity at low cost are traditional features in all Ex-Cell-O machines; features which have persuaded leading manufacturers to rely on Ex-Cell-O for over 30 years. For full information on how Ex-Cell-O can help you: write or cable Ex-Cell-O in Detroit.

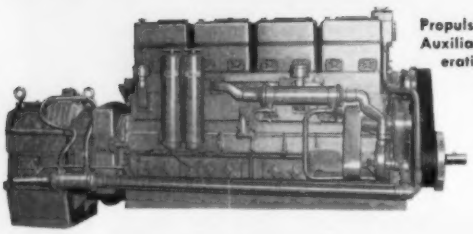
56-27

XLO EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN, U.S.A. CABLE ADDRESS: XLO, DETROIT, U.S.A.
PRECISION MACHINE TOOLS • CUTTING TOOLS • MACHINES TO PACKAGE MILK IN SANITARY PAPER CONTAINERS

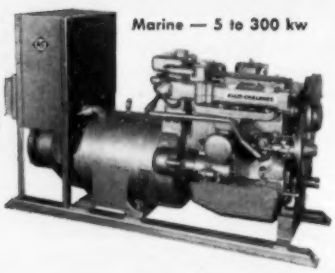
IT'S Allis-Chalmers BUDA DIESEL ENGINES for *any* Power Need

MARINE

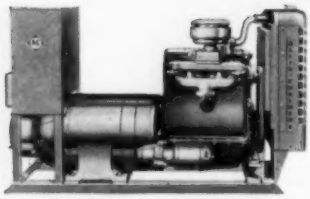


Propulsion — 9 to 508 hp
Auxiliary — AC or DC Generating Sets to 300 kw

GENERATING SETS



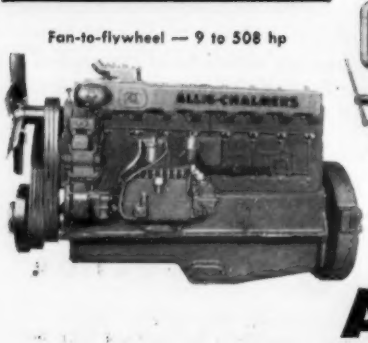
Marine — 5 to 300 kw

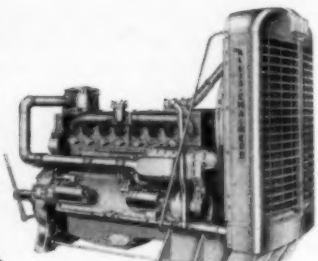


Industrial — 5 to 300 kw

EQUIPMENT POWER

Fan-to-flywheel — 9 to 508 hp





Open or Enclosed Power Units — 9 to 508 hp

For smooth, dependable diesel power, look to the broad Allis-Chalmers Buda engine line to meet your specific requirements . . . a full range of types and sizes, 9 to 508 hp, for any application — stationary or mobile power units, fan-to-flywheel engines, generating sets, marine engines.

Each of these offers high efficiency, long life and has all of the characteristics necessary for continuous as well as stand-by service. Heavy-duty construction, plus conservative power ratings, assures maintenance economy. Because of the way fuel and air are thoroughly mixed, combustion is more efficient, no fuel is wasted. The result is maximum power output and more economical operation.

Consult the Allis-Chalmers engine dealer, or write for complete information on diesel engines for every purpose.

ALLIS-CHALMERS, EXPORT DEPARTMENT MD1256,
TRACTOR DIVISION, MILWAUKEE 1, U. S. A.

ALLIS-CHALMERS

BEE-9

BUILDERS OF MACHINERY SINCE 1847

Underwater TV Camera

A hand-held underwater television camera enables divers to be supervised effectively from above water.

Instead of having to rely on a diver's report, a number of expert observers may view the underwater scene displayed on large-screen picture monitors. A permanent photographic record of the picture can be made.

The camera is intended for operation down to a depth of 250 feet. But to provide an adequate safety margin the container has been designed to withstand a water pressure of 220 pounds per square inch—or 500 feet. The unit is buoyant in water and weighs 38 pounds. **(Pye, Ltd., P.O. Box 49, Cambridge, England)**

LEGAL NOTICE

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT AND CIRCULATION OF

McGraw-Hill International Management Digest, published monthly at Albany, New York, for October 1, 1956

1. The names and address of the publisher, editor, managing editor, and business manager is: Publisher, McGraw-Hill International Corporation, 330 West 42nd Street, New York 36, N. Y.; Editor, Paul R. Miller, Jr., 330 West 42nd Street, New York 36, N. Y.; Managing Editor, Joseph A. Cohn, 330 West 42nd Street, New York 36, N. Y.; Business manager, William J. Maher, 330 West 42nd St., New York 36, N. Y.

2. The owner is: McGraw-Hill International Corporation, 330 West 42nd St., New York 36, N. Y. Sole stockholder: McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York 36, N. Y.; Stockholders holding 1% or more of stock are: Donald C. McGraw and Willard T. Chevalier, Trustees under Deed of Trust dtd. 1/14/21, as amended, m/b James H. McGraw, deceased; Donald C. McGraw and Harold W. McGraw as Trustees under Indenture m/b James H. McGraw dated 7/1/37, as amended; Donald C. McGraw, individually; Harold W. McGraw, individually; Elizabeth M. Webster, c/o Donald C. McGraw (all of 330 West 42nd St., New York 36, N. Y.); Mildred W. McGraw, Madison, New Jersey; Grace W. Mehren, 536 Arenas St., La Jolla, Calif.; Genoy & Co., P. O. Box 491, Church St. Station, New York, N. Y.; Merrill Lynch, Pierce, Fenner & Beane, 70 Pine St., New York, N. Y.; Touchstone & Co., c/o Wellington Fund, Inc., Claymont, Delaware.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustee, hold stock and securities in a capacity other than that of a bona fide owner.

McGRAW-HILL INTERNATIONAL CORPORATION

By John J. Cooke, Secretary

Sworn to and subscribed before me this 14th day of September, 1956

(SEAL) JANET A. HARTWICK

(My Commission expires March 30, 1957)

THIS CHAMP LICKS EVERY LIGHTING AND WELDING JOB!

BECAUSE THERE'S MORE GAS PER POUND

In The Familiar Green Drum Of Shawinigan "S" Brand Canadian Carbide

For more than fifty years Shawinigan "S" Brand Canadian Carbide, in its familiar green drum, has been used throughout the world to meet the most exacting job requirements. To be sure that the green drum you buy contains Shawinigan "S" Brand Canadian Carbide, look for the Shawinigan "S" trademark.

The quality of Shawinigan's many other chemicals is also helping industry to achieve higher standards around the world. Whenever, wherever, you need carbide or other organic chemicals to do a better job—always specify Shawinigan.

Acetic Acid
Acetic Anhydride
Acetylene Black
Butyl Acetate
Calcium Carbide
Dibutyl Phthalate
Ethyl Acetate
Monochloroacetic Acid
Butyl Alcohol

SHAWINIGAN
TRADE MARK REGISTERED

SHAWINIGAN CHEMICALS LIMITED

Shawinigan Building, Montreal, Que., Canada

▶ YOUR MANAGEMENT READING

Management Digest's editorial staff here again does the "worthwhile reading" for you to save your time. For the following literature, please write on your company letterhead directly to the address given, mentioning Management Digest.

Better Human Relations—"Influencing Employee Behavior" shows the supervisor how to be more effective in his relations with employees. This book explains how to present suggestions, instructions, and directions in order to get favorable employee response. Price: $4.95. (McGraw-Hill Book Company, 330 W. 42nd Street, New York 36, New York.)

Studying Sterling—"Sterling: Its Meaning in World Finance" tackles the hardest questions relating to sterling's place in the world. It offers a critical analysis from an American point of view of sterling's past, present, and future. Price: $3.75. (Harper Brothers, 49 E. 33rd Street, New York, New York.)

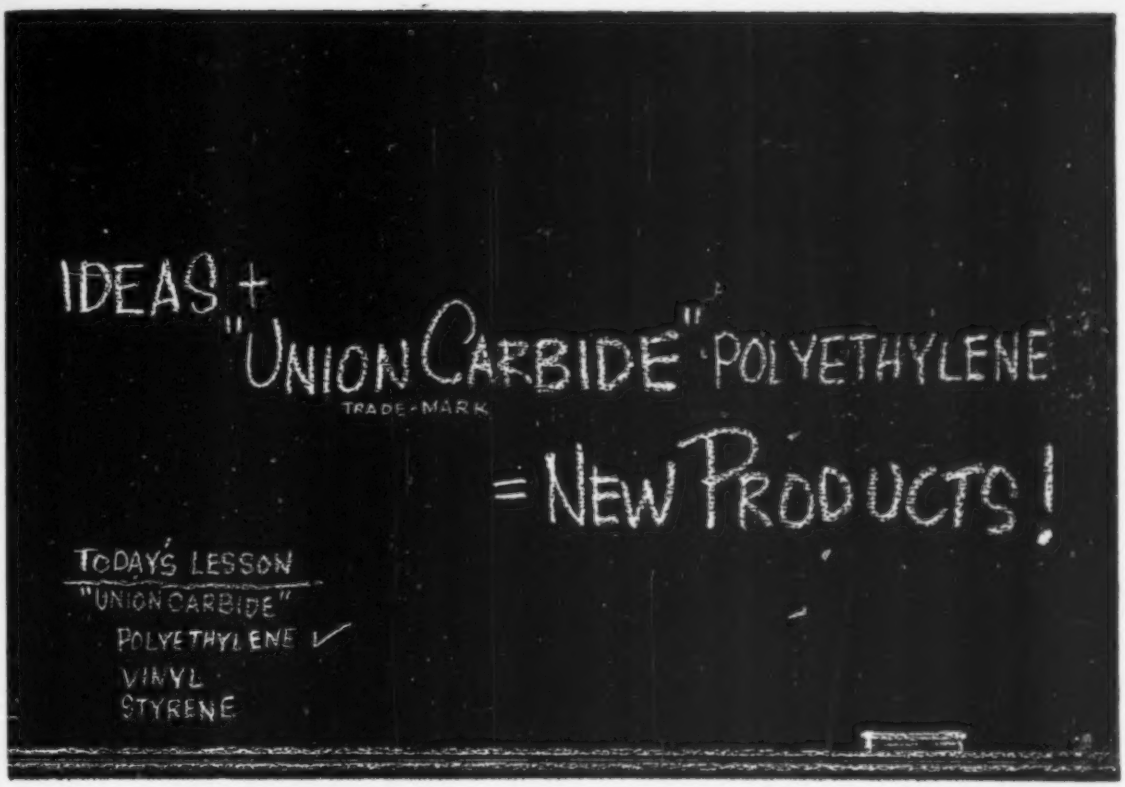
Bulletins from Industry—Norton's "Handbook on Tool Room Grinding" covers general grinding, carbide tools, and cast alloy tools. (Norton Company, Worcester 6, Massachusetts). . . . Instruments for analysis, control, and data processing are described in a new general catalog. (Consolidated Electrodynamics Corp., 330 North Sierra Madre Villa, Pasadena, California). . . . A compact, lightweight refrigerating machine for building and industrial processing requirements is presented in illustrated catalog. (Carrier Corp., Syracuse, N. Y.). . . . A 128-page booklet explains apparatus for tests of soils, concrete, asphalt, and construction materials. (Soiltest Inc., 4711 W. North Avenue, Chicago 39, Illinois.)

New Markets for New Products—This case study—covering plastics, fibrous glass, and aluminum—analyzes efforts to build markets for these materials, identifies the characteristic marketing problems and possible solutions. Price: $4.00. (Riverside Press, Harvard University, Cambridge, Massachusetts.)

Trading with France, or Canada?—Fraser's Canadian Trade Directory contains product classifications, alphabetical lists of manufacturers and trade names, data on the Canadian market. Price: $7.50. (Fraser's Trade Directories Ltd., 1520 Mountain Street, Montreal 25, P. Q., Canada). . . . The 23rd Annuaire Industrial classifies French suppliers of materials and machines. A complete description of the 35,000 most important French business firms is included. (Annuaire Industrial, 27 Rue du Mont Thabor, Paris, France.)

Publications of the ICC—Don't overlook International Chamber of Commerce publications in the fields of financial policy, production and advertising (these include market studies for certain products in different countries), transport and communications, law and commercial practice, and publications of a general character. Brochures are printed in English and French (occasionally other languages). (International Headquarters of the ICC, 38 Cours Albert Ier, Paris VIIe, France or U. S. Council of the ICC, 103 Park Avenue, New York 17, New York.)

Tungsten's Future—"Tungsten—An Indispensable Metal" is a 28 page book containing a summary of the growing applications for tungsten. (The Tungsten Institute, 1757 K Street, NW, Washington 6, D. C.)



UNION CARBIDE polyethylene is the plastic with which *you* can translate ideas into new products... new successful products to meet a mounting consumer demand for this remarkable plastic.

This plastic's nature facilitates planning when lightness, flexibility, toughness, abrasion and chemical resistance are needed. It can be molded, extruded, or formed into film. Indeed, it can assuage anxieties which so often attend the development of any new product. Easily fabricated, UNION CARBIDE polyethylene can help solve your design and production problems.

New facilities for the production of polyethylene have made increased quantities of UNION CARBIDE polyethylene resins and compounds available.

For additional information, write for booklet PM-12, "UNION CARBIDE Polyethylene".

UNION CARBIDE
TRADE-MARK
POLYETHYLENE

PLASTICS DEPARTMENT
UNION CARBIDE INTERNATIONAL COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, New York, U.S.A.
Cable Address: UNICARBIDE, New York

The term UNION CARBIDE is a trade-mark of Union Carbide and Carbon Corporation.

Publications Digested

McGraw-Hill Publishing Co., Inc., 330 W. 42nd St., New York 36, N. Y.

American Automobile
American Letter
American Machinist
Aviation Week
Business Education World
Business Week
Bus Transportation
Chemical Engineering
Chemical Week
Coal Age
Construction Methods & Equipment
Control Engineering
El Automovil Americano
Electrical Construction & Maintenance
Electrical Merchandising
Electrical West
Electrical Wholesaling
Electrical World
Electronics
Engineering & Mining Journal
E&MJ Metal & Mineral Markets
Engineering News-Record
Factory Management & Maintenance
Fleet Owner
Food Engineering
Industrial Distribution
Ingenieria Internacional Construccion
Ingenieria Internacional Industria
Metalworking Production (London)
National Petroleum News
Nucleonics
Petroleum Processing
Petroleum Week
Power
Product Engineering
Textile World
Today's Secretary

American Builder, Marine Engineering, Railway Age, Railway Track and Structures, Railway Locomotive and Cars, Railway Signaling & Communications
Simmons-Boardman Publishing Corp., 30 Church St., New York 17, N. Y.

American Business
Dartnell Publications, Inc., 4660 Ravenswood Ave., Chicago, 40, Ill.

Architectural Record
F. W. Dodge Corp., 191 W. 40th St., New York 18, N. Y.

Banking
American Bankers Association, 12 E. 36th St., New York 16, N. Y.

Business
Business Publications Ltd., Mercury House, 109-119 Waterloo Road, London

Ceramic Industry
Industrial Publications, Inc., 5 South Wabash Ave., Chicago 3, Ill.

The Controller
Controllers Institute of America, Inc., Two Park Ave., New York 16, N. Y.

The Economist
The Economist Newspaper, Ltd., 22 Ryder St., London

Harvard Business Review
Harvard University, Soldiers Field, Boston 63, Mass.

Heating, Piping & Air Conditioning
Keeney Publishing Co., 6 N. Michigan Ave., Chicago 2, Ill.

Industrial Marketing
Advertising Publications, Inc., 200 E. Illinois St., Chicago 11, Ill.

The Management Review, Personnel, Supervisory Management
American Management Association, 1515 Broadway, New York 36, N. Y.

Metal Progress
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Modern Packaging, Modern Plastics
Breskin Publications, 575 Madison Ave., New York 22, N. Y.

The Oil and Gas Journal
Petroleum Publishing Co., 211 S. Cheyenne Ave., Tulsa 1, Okla.

The Paper Industry
Fritz Publications, Inc., 431 S. Dearborn St., Chicago 5, Ill.

Petroleum Press Service
Petroleum Press Service, 91 & 93 Bishopsgate, London

Plastics, The British Motor Ship
Temple Press Ltd., Bowling Green Lane, London

Printers' Ink
Printers' Ink Publishing Co., Inc., 205 E. 42nd St., New York 17, N. Y.

The Rubber and Plastics Age
Rubber and Technical Press, Ltd., 147 Grosvenor Rd., Westminster, London

Sales Management
Bill Brothers Publishing Corp., 386 Fourth Ave., New York 16, N. Y.

The Times Review of Industry
The Times Publishing Co., Ltd., Printing House Square, London

Welding Engineer
Welding Engineer Publications, Inc., 12 East Grand Ave., Chicago 11, Ill.

Index to Advertisers

ADVANCE TRANSFORMER CO. 23
ALCO PRODUCTS, INC. 52
ALLEN BUSINESS MACHINES, INC., R. C. 56
ALLGEMEINE ELEKTRICITATS-GESELLSCHAFT... 5
ALLIS-CHALMERS MANUFACTURING CO., INDUSTRIES GROUP 57
ALLIS-CHALMERS, TRACTOR GROUP 68
AMERICAN AIR FILTER CO., INC. 23
AMERICAN BLOWER CORP. 28
BETHLEHEM STEEL EXPORT CORP. 32
BUNDY TUBING COMPANY ..... 2nd Cover
BURROUGHS CORPORATION ..... 4th Cover
CHESAPEAKE & OHIO RAILWAY 1
CHRYSLER CORP., EXPORT DIVISION 19
CIMEX-FRASER TUSON LTD. 41
CLARK EQUIPMENT INTL., C. A. 36, 37
CLEMSON BROS., INC. 62
COMBUSTION ENGINEERING 12
CUMMINS DIESEL EXPORT CORP. 64, 65
DELORO SMELTING AND REFINING COMPANY LTD. 25
DICK INT'L CO., A. B. 6
EX-CELL-O CORPORATION 67
FORD MOTOR CO., LTD. 10
GENERAL MOTORS OVERSEAS OPERATIONS.. 46
GLOBE HOIST COMPANY 39
HEWITT-ROBINS INT'L DIV. 50, 51
HITACHI, LTD. 24
IBM WORLD TRADE CORP. 2
INTERNATIONAL GENERAL ELECTRIC CO. 9
LINK-BELT COMPANY 38
MALLORY & CO., INC., P. R. 29
MUELLER BRASS COMPANY 27
NATIONAL BROACH & MACHINE CO. ..... 3rd Cover
NORDBERG MANUFACTURING CO. 11
REMINGTON RAND INC. 22, 40
ROYAL McBEE INTERNATIONAL 60
SHAWINIGAN CHEMICALS LTD. 69
STURTEVANT MILL COMPANY 44
TRACTOMOTIVE CORPORATION 43
UNDERWOOD CORP. 45
UNION CARBIDE INTL. CO. 71
WILLYS-OVERLAND EXPORT CORP. 61

•

CONSULTING SERVICES 66

This index is a service to readers. Every effort is made to maintain its accuracy, but *MANAGEMENT DIGEST* assumes no responsibility for errors or omissions.

A Tip to the Buyer of GEAR SHAVING CUTTERS

Engineers of the Red Ring Cutter Division are concerned with gear shaving cutters exclusively. The same applies to this Division's manufacturing personnel. These men have no other job responsibility. And, in 25 years they have accumulated more experience in this highly specialized field than any other group anywhere. Machines and equipment for the production of cutters are used for no other purpose.

This experience is part of every Red Ring Cutter you buy. When you encounter a tough problem you can call for help. When you need a cutter to produce a gear with certain special characteristics Red Ring specialists will develop it.

Don't underestimate the value of this extra protection even though it isn't apparent in the price you pay for Red Ring Gear Shaving Cutters.

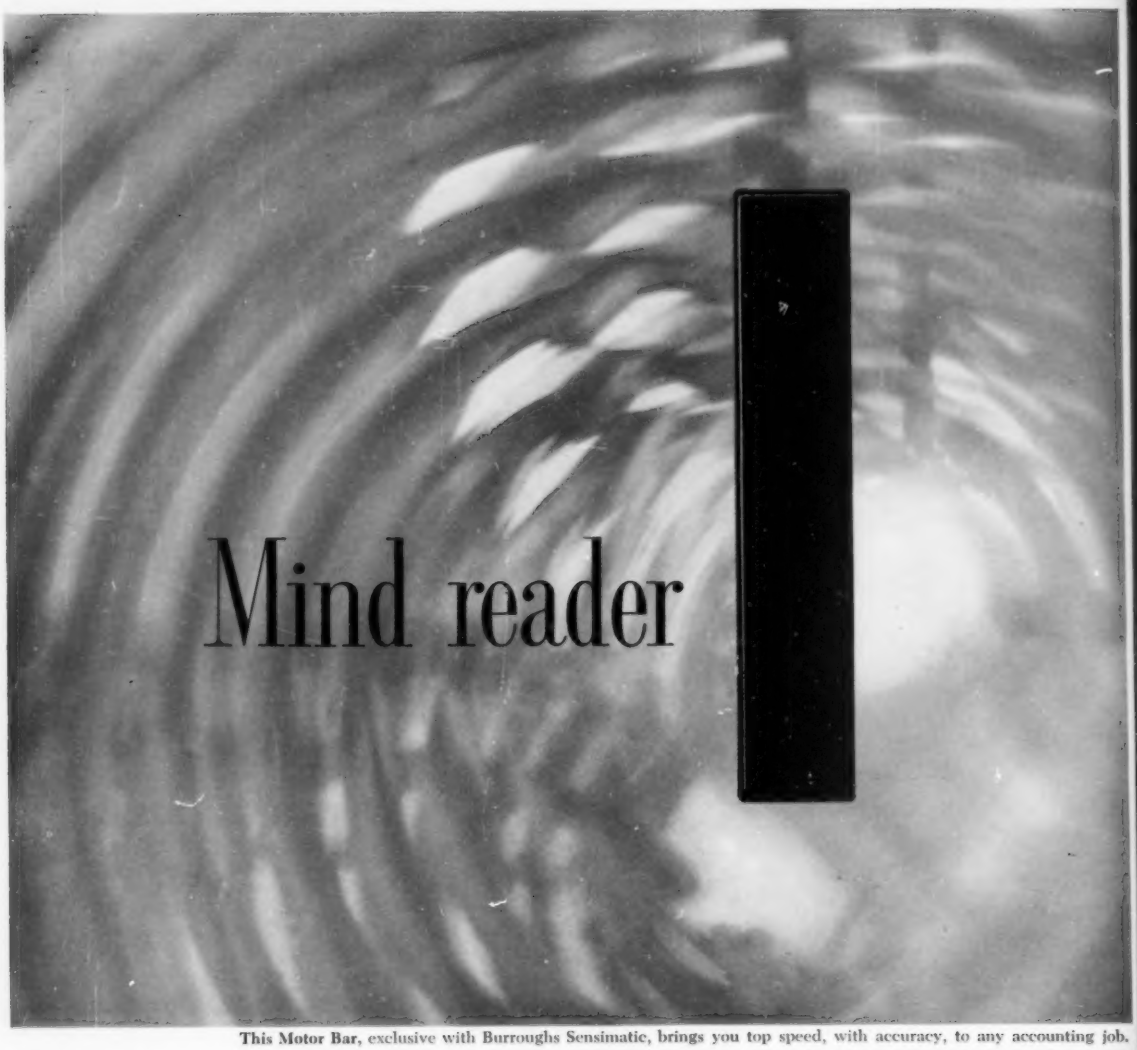
7457

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORM

NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT



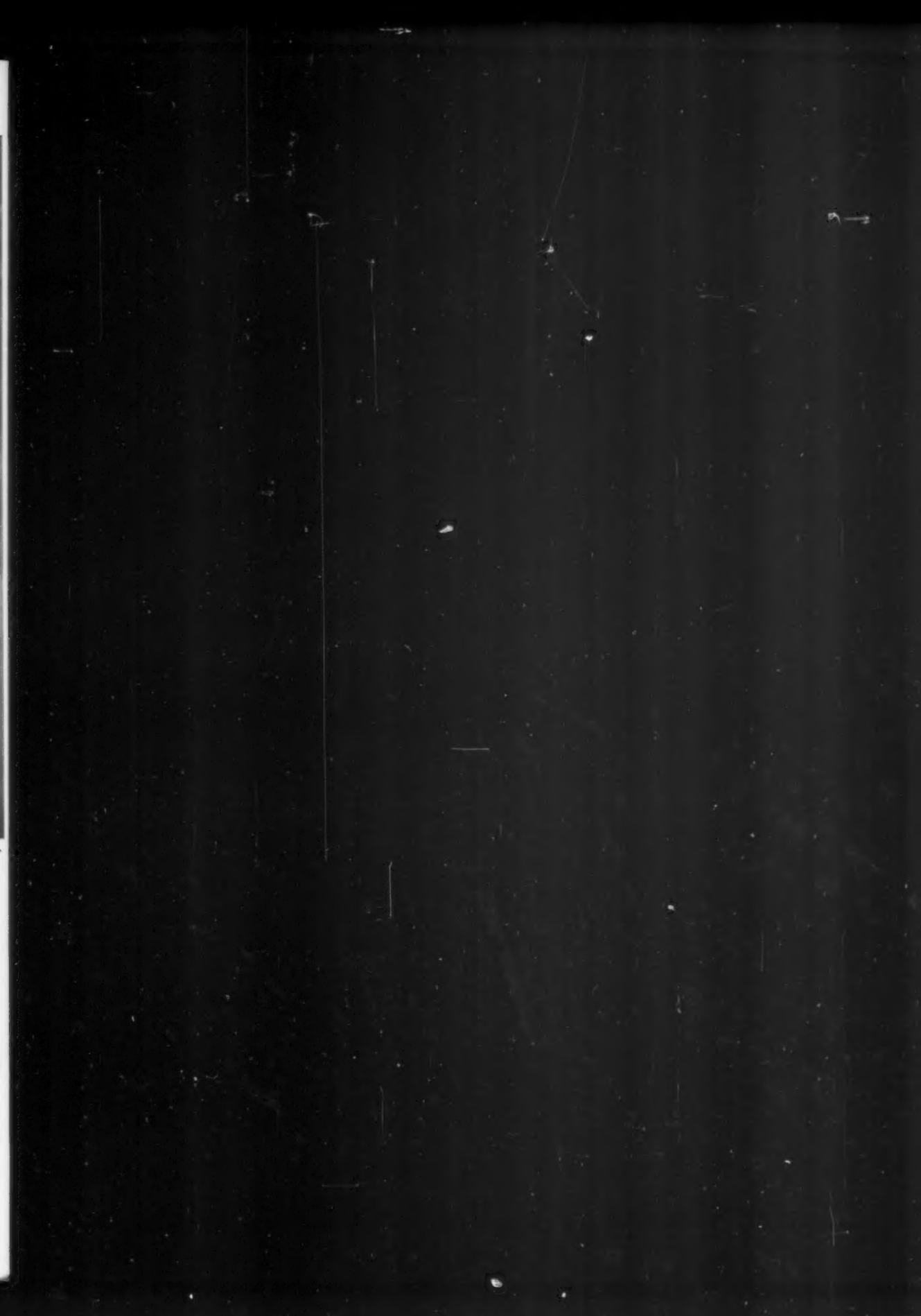
This Motor Bar, exclusive with Burroughs Sensimatic, brings you top speed, with accuracy, to any accounting job.

takes the "chance" out of your accounting jobs

TOUCH AND—GO! No machine can make accounting jobs completely error-free. But users of the Burroughs Sensimatic agree that this machine comes as close as possible.

In the photo above, you see one important reason: the Sensimatic's exclusive "90% Motor Bar." It works like mental telepathy! Nine times out of 10 the operator touches this one bar—and the Sensimatic master control makes the further decisions—automatically.

Fact is, this one bar frees a worker of so many decisions that every accounting job comes down to little more than inserting the proper form and indexing the correct figures. And what the Sensimatic does automatically, a worker can't possibly do incorrectly.

The Sensimatic can be operated easily by anyone who runs an ordinary adding machine. Even a beginner can complete a job in record time. See for yourself how it works. Call your local Burroughs man. For his address, write to Burroughs Corporation, Detroit 32, Michigan, U.S.A.

Call your **Burroughs Man**